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T Plant Aggregate Area Management Study Technical Baseline Report

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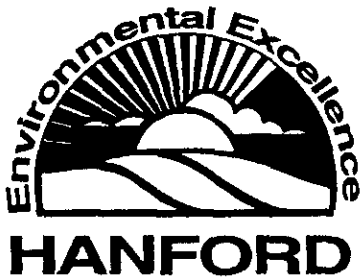

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ACRONYMS

amsl	above mean sea level
BHI	Bechtel Hanford, Inc.
c/m	counts per minute
ct/s	counts per second
DOE	U.S. Department of Energy
FIC	flow indicator controller
HNO_3	nitric acid
PNL	Pacific Northwest Laboratory
QA/QC	quality assurance/quality control
REDOX	reduction and oxidation
RL	U.S. Department of Energy, Richland Operations Office
SST	single-shell tank
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
UNH	uranyl nitrate hexahydrate
UO_3	uranium oxide
UPR	unplanned release
WHC	Westinghouse Hanford Company
WIDS	waste information data system

1.0 INTRODUCTION

This document is prepared in support of the T Plant Aggregate Area Management Study, located in the 200 West Area, at the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. It provides a technical baseline of the aggregate area and results from an environmental investigation undertaken by the Technical Baseline Section of the Environmental Engineering Group, Westinghouse Hanford Company (WHC) and by EBASCO, providing support under contract to WHC. This document is based on review and evaluation of numerous Hanford Site current and historical reports, drawings and photographs, supplemented with site inspections and employee interviews. No intrusive field investigations or sampling were conducted.

This document was written in 1991 and has been edited for publication as a Bechtel Hanford, Inc. (BHI) document to allow the information to be referenced in current documents. Some information identified as current, as of 1991, may not be current as of 1995 because of changes in mission, scope, plan, or political climate.

Most of the historical documents from which data was extracted for this report provide dimensions in nonmetric units of measure. In the interest of accuracy, data is reported here as it was provided in reference documents and no conversions to metric are provided.

The T Plant Aggregate Area is made up of seven operable units; 200-TP-1 through TP-6 and 200-SS-2, and consists of liquid and solid waste disposal sites in the vicinity of, and related to, T Plant operations. Figure 1-1 depicts the location of each unit.

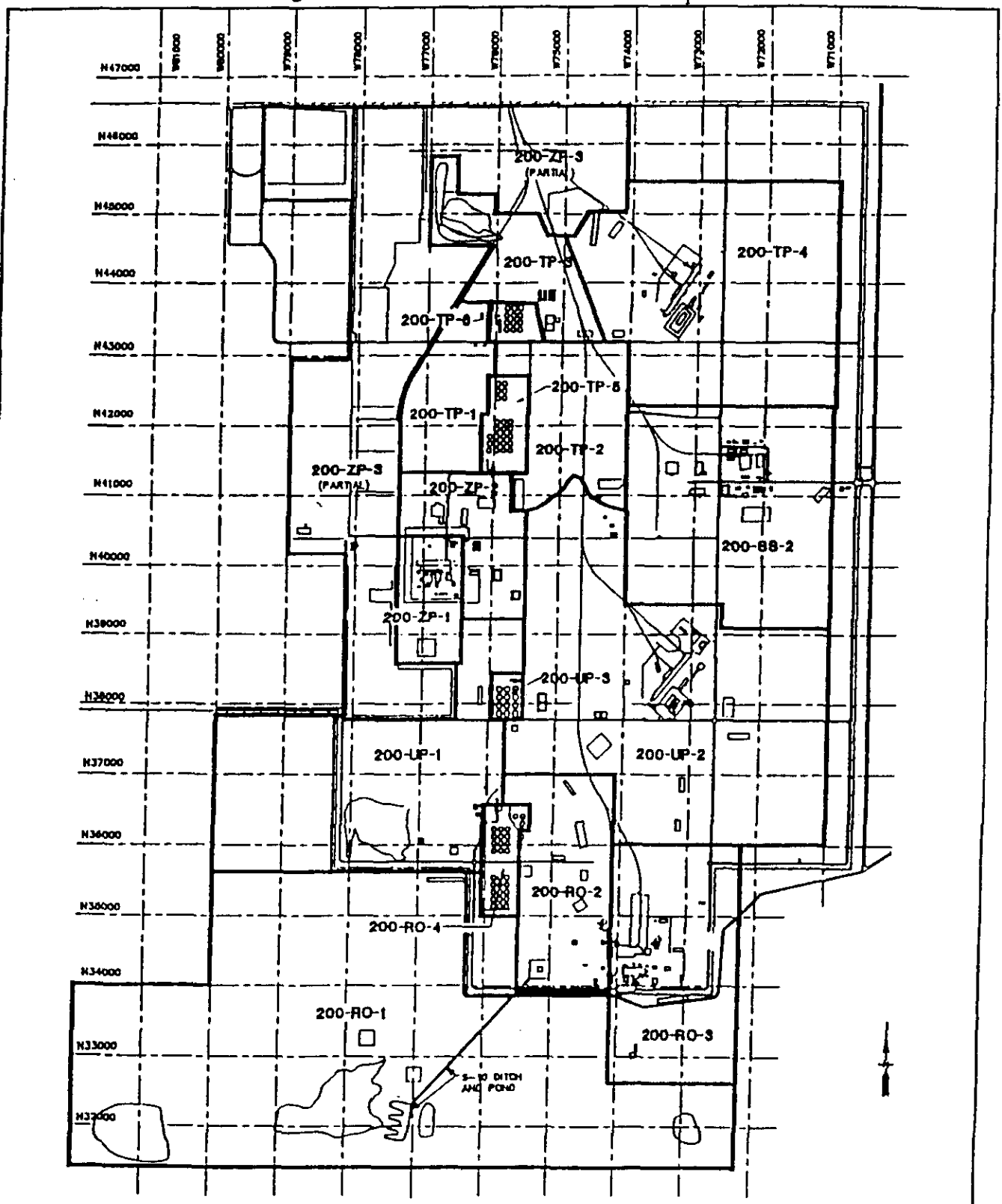
T Plant refers to the 221-T canyon building, a chemical separation facility constructed in 1944 to chemically extract plutonium contained in irradiated uranium fuel rods discharged from Hanford reactors, and to related buildings in the immediate area.

This report describes T Plant and its waste sites, including cribs, french drains, septic tanks and drain fields, trenches and ditches, ponds, catch tanks, settling tanks, diversion boxes, underground tank farms designed for high-level liquid wastes, and the lines and encasements that connect them. Each waste site in the aggregate area is described separately. Close relationships between waste units, such as overflow from one to another, are also discussed. Photographs are provided in Appendix A.

An environmental summary for this aggregate area is not provided here. An excellent summary may be found in *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1990), which describes geology and soils, meteorology, hydrology, land use, population, and air quality.

The Hanford Site is extremely complex and has been operating as a highly compartmentalized facility for almost 50 yr under the supervision of several different operators. In some instances, successor operators implemented their own numbering schemes to identify physical plant facilities, such as buildings, disposal sites and utilities, and significant operational events such as unplanned releases (UPR). Therefore, many sites have had more than one designation since the site became operational. This practice of renumbering has been discontinued. Past-site identification numbers, referred to as aliases, are cross referenced for each site and included the Hanford Site Waste Information Database System (WIDS) (BHI 1994). Photographs of the waste sites, when available, are contained in Appendix A and a list of photographs and drawings by waste site are contained in Appendix B.

Figure 1-1. 200 West Area Site Location Map.



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JAA			1/89	1.0	
JAA			12/89	2.0	INFORMATION UPDATE

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

200 West Area
Key Plan

BHI00177.R00/V

2.0 BACKGROUND

2.1 PLANT DESCRIPTION

T Plant is the central feature and key operational facility of the aggregate area and is therefore described here even though it will not be remediated as part of this aggregate area. Figure 1-1 depicts the general area of facilities discussed in this report.

Uranium-bearing fuel rods were irradiated in one of the several Hanford production reactors; a process that creates plutonium from uranium. The irradiated rods were transferred to T Plant where a bismuth phosphate chemical separation process was used to extract the plutonium.

T Plant is one of five Hanford canyon buildings; so called because of their monolithic size and the canyon-like appearance of their upper galleries. The 221-T canyon building is 875 ft by 85 ft by 102 ft high and is constructed entirely of concrete. The 221-T canyon building process equipment is contained in small rooms, called cells, which are arranged in rows in an area spanned by a traveling crane. The cells are topped with 4-ft-thick concrete blocks that are removable by crane to provide access to the cell beneath. Above the blocks is a space equal in height to the cell depth, thus providing headroom for manipulating the process equipment during maintenance operations. Heavy concrete shielding walls enclose this space up to the level of the crane rails, giving the appearance of a canyon (AEC-GE 1964).

T Plant chemical separation processes were based on dissolving the jacketed fuel rods in nitric acid and conducting multiple purification operations on the resultant aqueous nitrate solution. The fuel elements were charged into dissolver vats in 3-ton batches. The aluminum jackets were dissolved with a sodium hydroxide solution to which sodium nitrate was added to avoid formation of too much hydrogen. The resulting sodium aluminate-sodium nitrate solution was jetted (transferred via a steam jet) to waste. The remaining uranium metal slugs were rinsed with water and dissolved in 50% to 60% nitric acid. The bismuth phosphate process was then used to extract plutonium from the dissolved fuel rods.

No attempt to recover uranium was made in this process. Sodium nitrate solution was added to a batch of dissolver solution to ensure that the plutonium present had a valence of +4, then bismuth nitrate and phosphoric acid were added. The resulting precipitate was separated from the solution in a solid-bowl centrifuge, and the solution was jetted to waste. The precipitate was washed in the centrifuge and dissolved in strong nitric acid. The valence of the plutonium was then adjusted to +6 by adding a dichromate solution, and the precipitate of bismuth phosphate was again formed. This time the precipitate held some of the fission products that were not extracted in the first liquid waste stream, but the plutonium remained in the solution. These precipitation cycles were repeated twice.

The product from this process was a dilute plutonium solution that was transferred to the 224-T concentration building where it was purified and its volume reduced. It was then transferred to the isolation building for final treatment before being shipped offsite (Ballinger and Hall 1989).

2.2 LIQUID WASTE HANDLING

Chemical and radiological wastes from the various Hanford production facilities have been segregated according to potential radionuclide contamination and stored or disposed accordingly. High-level wastes are stored in underground tanks while intermediate level wastes were, until 1973, routed to underground cribs for disposal. Low-level wastes such as cooling water were routed to ponds and open ditches for disposal (Smith 1980). For a brief period in its early months of operation, all T Plant liquid wastes that were not stored in underground tanks were discharged to open trenches and ponds. This practice was discontinued in the spring of 1945 when the T Plant pond demonstrated high-dose rates and wind-spread contamination was discovered. Reverse wells were then utilized for intermediate-level wastes while low-level wastes continued to be routed to the pond. Reverse wells proved unsatisfactory, because of plugging and the impact on groundwater, and were replaced by cribs by the mid 1940's, although one T Plant reverse well, 216-T-2, continued to operate until 1950. This report describes waste sites that received all levels of waste.

T Plant wastes were both chemically and radiologically contaminated but their disposition was accomplished in accordance with radiological content. Organic solvent bearing wastes were classified as intermediate level wastes and were disposed to the several cribs that supported T Plant operations.

Two types of cribs were utilized to support T Plant operations. The first was an underground chamber that received liquid wastes into a box-like, open-bottomed structure made of wooden timbers. The second was a drain field, or tile field, that introduced liquid wastes to soil through many yards of perforated underground pipe.

Both types typically rested in a gravel bed to aid in rapid dispersion of liquid to soil. Particulate matter, especially heavy metals such as uranium and plutonium that were contained in T Plant liquid wastes, tended to be filtered by the first few inches or feet of soil and thus were effectively contained in the soils immediately beneath the crib. Hanford drawing H-2-821 (216-T-19 crib) shows a typical example of a T Plant crib.

Other intermediate level liquid wastes were disposed to the soil through french drains. Low-level liquid wastes were directed to open trenches and ponds. French drains are underground gravel-filled encasements, usually concrete or tile pipe, with open bottoms, generally used for disposal of small volumes of low-level waste.

Trenches are commonly used for the disposal of high-salt waste or waste containing complexed radionuclides. Many of the trenches at Hanford are designated "specific retention" trenches. This name comes from the fact that the trenches were designed to be used until they had accumulated a specific number of curies of radioactivity. French drains are used for the disposal of small-volume and generally low-level waste (Nelson 1980; Fecht et al. 1977).

There were several common methods for transporting liquid waste across the site; these include ditches, underground and aboveground pipelines, and trucks. Aboveground pipelines have been removed from all sites in this report. Ditches are addressed, but pipelines are not specifically discussed as potential waste sites. The photograph marked "200 West" in Appendix A (Hanford photograph A-1) depicts a schematic diagram of the major waste distribution and disposal systems in the 200 West Area.

Hanford Site radiation zones are clearly marked and are commonly protected by barricades. The most common warning signs are "Surface Radioactive Contamination" and "Underground Radioactive Contamination." Detection and monitoring capabilities have evolved since the site first became operational and the meaning of warning signs and barricades has also been modified. Before 1988, barricades were required around areas where measurements exceeded 200 counts per minute (c/m). Since 1988, any area with radiation levels above detection level (using portable instruments) (about 50 c/m beta/gamma) have been barricaded. Background levels are approximately 40 c/m at the Hanford Site (Huckfeldt, personal communication). It should also be noted that before the early 1970's, the limit of detection was about 100 c/m and only gamma radiation was measured routinely (Mikulecky, personal communication).

3.0 OPERABLE UNIT 200-TP-1

Operable unit 200-TP-1 is located west of the T, TX, and TY tank farms (Figure 3-1). Six trenches and three cribs constitute the waste sites in this operable unit. Except for the 216-T-32 crib, all cribs contain mixed waste and are inactive (Table 3-1). The 216-T-7TF tile field (crib) contains more waste than the other eight units combined, and it is the only site within the operable unit that has been rated a significant hazard (Table 3-2) (Stenner et al. 1988). Table 3-3 provides a summary of current site conditions based on several site visits performed by the authors during September and October 1991.

A list of the organic and inorganic contaminants that were part of the waste disposed of in the area are given in Table 3-4. This data was extracted from BHI (1994) and has not been validated by the authors. It should be used as a guideline only.

Figure 3-2 provides a graphical summary of the operational history of the individual sites. The starting and stopping dates are based on data contained in BHI (1994).

3.1 216-T-5 TRENCH

This site is located 300 ft north of 23rd Street and 1,000 ft west of the 207-T retention basin. The trench is west of the 216-T-32 crib and north of the 216-T-7 crib and tile field (BHI 1994). It is enclosed with a light chain barricade (Hanford photograph A-2). The surrounding area, including the 216-T-7TF tile field, is enclosed by another light chain barricade (site visit by authors, September 1991).

A total of 2,600,000 L of second-cycle supernatant waste was received from the 221-T canyon building via the 112-T tank in the 241-T tank farm. The waste is high salt, neutral/basic, and includes 345 metric tons of inorganic compounds (BHI 1994).

The trench is a specific retention trench, and was taken out of service when it received the prescribed liquid waste volume. When deactivated, the aboveground piping was removed and the trench was backfilled. Well W10-1 is used to monitor the trench. Radioactivity was detected, by a scintillation probe survey performed in 1959, from the surface to a depth of 38.1 m. Since 1959 the activity has decreased and in 1976 the radiation levels were near background (Fecht et al. 1977).

3.2 216-T-7TF CRIB AND TILE FIELD

The 216-T-7TF crib and tile field are 50 ft north of 23rd Street and 1,000 ft west of the 207-T retention basin. The crib is within the southwest quarter of the 241-T tank farm while its tile field is outside the tank farm fence (BHI 1994).

The site received second-cycle supernatant waste from the 221-T canyon building via the 241-T-112 tank and cell drainage from tank 5-6 in the 221-T canyon building.

Figure 3-1. Location Map for Operable Units 200-TP-1, 200-TP-2, and 200-TP-5 (DOE-RL 1988).

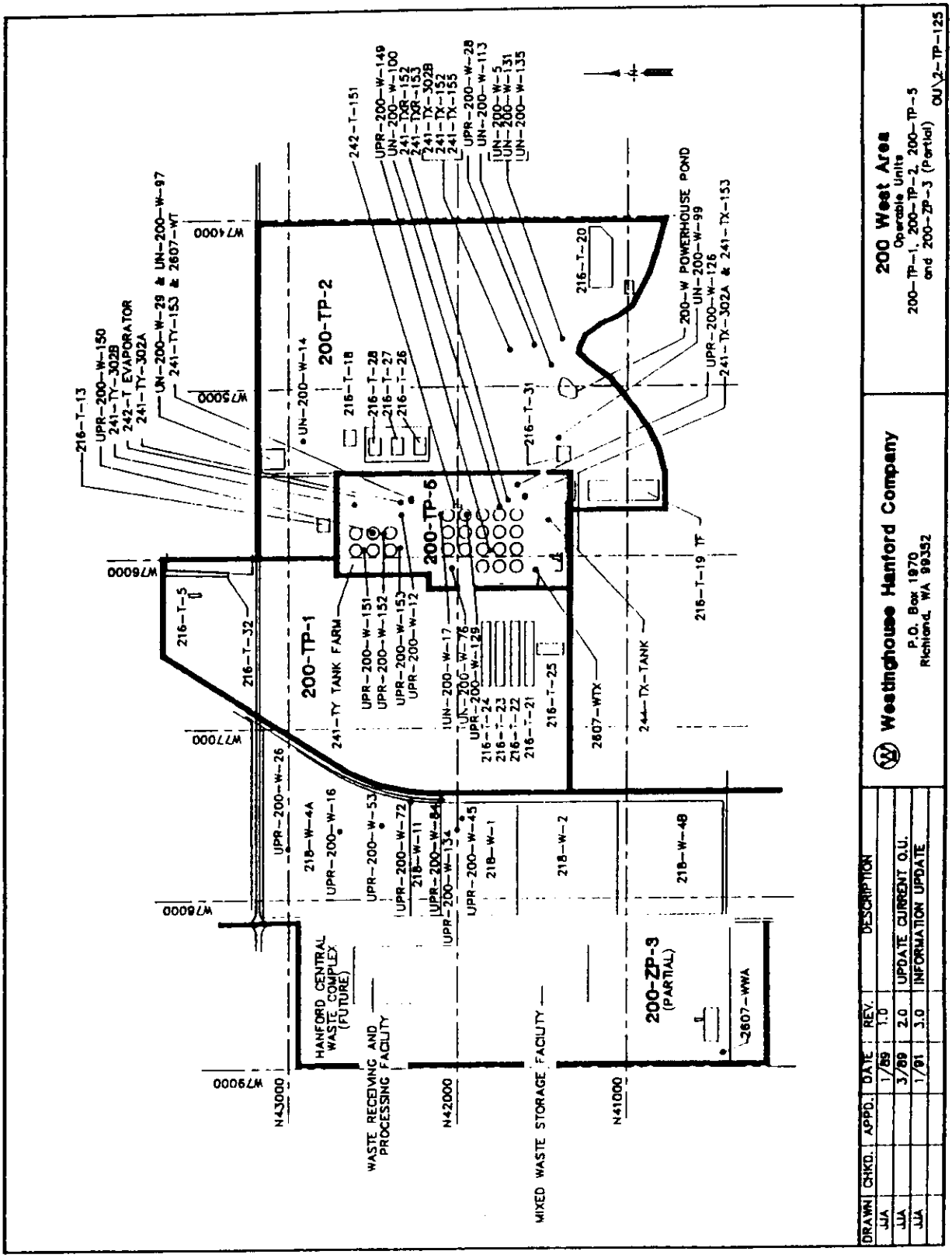


Table 3-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-1 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
216-T-21	Trench	Inactive	N41530 W76690, N41530 W76450 (centerline)	Mixed Waste
216-T-22	Trench	Inactive	N41620 W76450, N41620 W76690 (centerline)	Mixed Waste
216-T-23	Trench	Inactive	N41710 W76450, N41710 W76690 (centerline)	Mixed Waste
216-T-24	Trench	Inactive	N41800 W76450, N41800 W76690 (centerline)	Mixed Waste
216-T-25	Trench	Inactive	N41890 W76485, N41890 W76690 (centerline)	Mixed Waste
216-T-32	Crib	Inactive	N43397 W76058 (center #1), N43447 W76000 (center #2)	TRU-Contaminated Soil Site/Mixed
216-T-36	Crib	Inactive	N43093 W76000, N43093 W76160 (centerline)	Mixed Waste
216-T-5	Trench	Inactive	N43550 W76200, N43500 W76200 (centerline)	Mixed Waste
216-T-7TF	Crib	Inactive	N43300 W76000 (crib), N43300 W76000, N43300 W76305 (tile field)	Mixed Waste

Table 3-2. Operational Data and Waste Volumes for Operable Unit 200-TP-1 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking
216-T-21	Liquid	June 1954	August 1954		Bot	240	10	10	120	460000	1.52
216-T-22	Liquid	July 1954	August 1954		Bot	240	10	10	120	1530000	1.67
216-T-23	Liquid	July 1954	August 1954		Bot	240	10	10	120	1480000	1.25
216-T-24	Liquid	August 1954	August 1954		Bot	240	10	10	120	1530000	1.67
216-T-25	Liquid	September 1954	September 1954		Bot	180	10	10	89	3000000	1.89
216-T-32	Liquid	November 1946	May 1952		Top	68	14	26	460	29000000	1.42
216-T-36	Liquid	May 1967	February 1969		Bot	160	10	15	410	522000	1.38
216-T-5	Liquid	May 1955	May 1955		Bot	50	10	12	44	2600000	1.25
216-T-7TF	Liquid	April 1948	November 1955		Top	0	0	0	4500	110000000	65.44

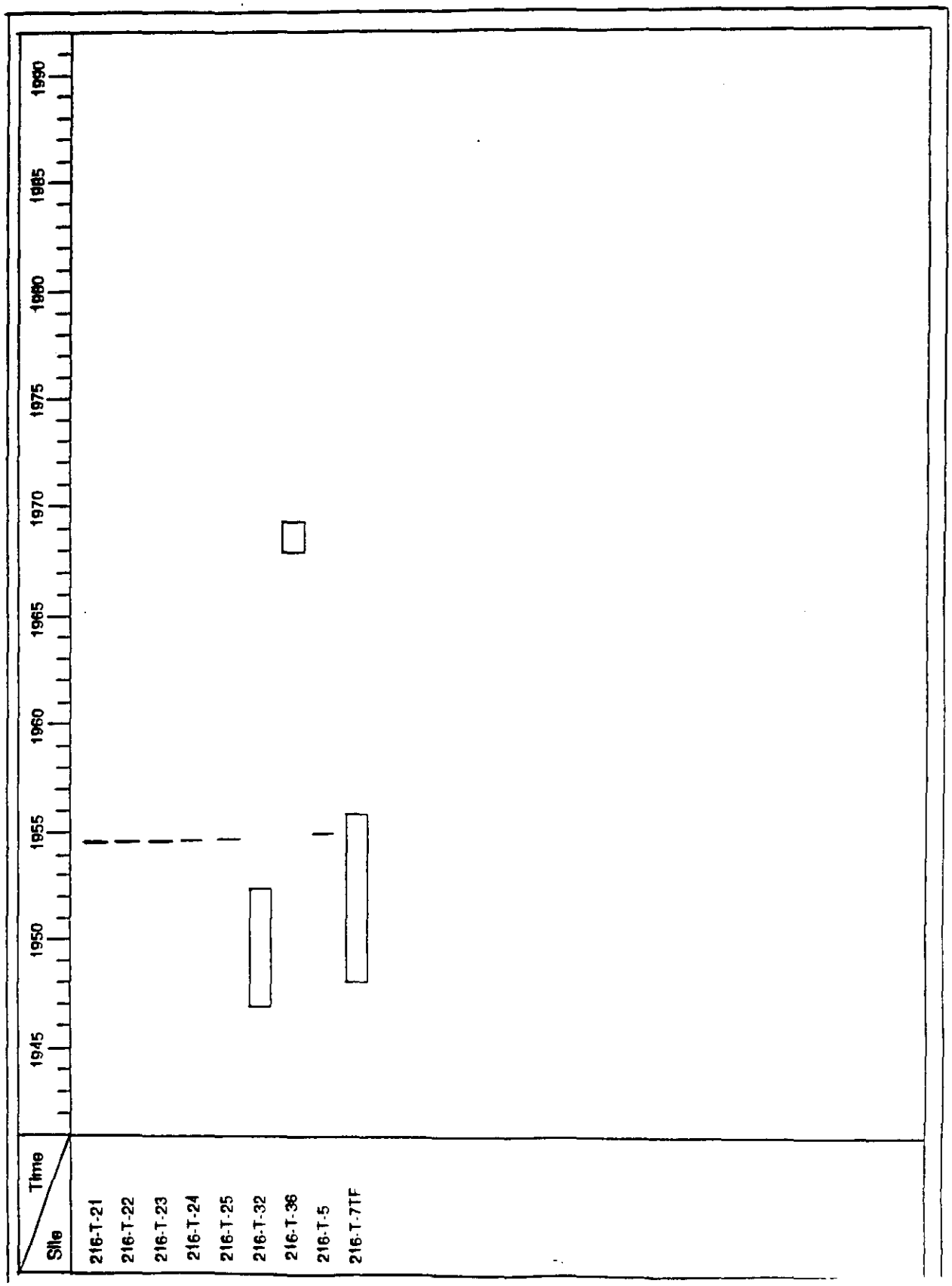
Table 3-3. Summary of Current Site Conditions for Operable Unit 200-TP-1.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-T-21	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	125603
216-T-22	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	0
216-T-23	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	0
216-T-24	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	0
216-T-25	None	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	0
216-T-32	Light Chain	Could not determine	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
216-T-36	Light Chain	Surf.+Underground Contam.	Metal Post with Plaque	Soil cover/Backfill	1.0	Non-native Grass	None	8556	8556
216-T-5	Light Chain	Surf.+Underground+Cave-In	Could not determine	None/Unknown	0.0	Brush/Grass	None	0	0
216-T-7TF	Chain-Link Fence	Surf.+Underground Contam.	Could not determine	None/Unknown	0.0	None	Inside Fenced Area	0	0

Table 3-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-TP-1 (BHI 1994).

Site	Fluoride (kg)	FeCN (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	Na Al (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-T-21	1200	0	0	0	28000	4000	4000	0	1500	0	4000	40000	9000	1800
216-T-22	4000	0	0	0	90000	13000	12000	0	5000	0	14000	120000	29000	6000
216-T-23	4000	0	0	0	90000	12000	12000	0	5000	0	14000	120000	28000	6000
216-T-24	4000	0	0	0	90000	13000	12000	0	5000	0	14000	120000	29000	6000
216-T-25	40000	0	0	0	900000	130000	120000	0	50000	0	140000	1200000	290000	60000
216-T-32	160000	0	0	0	1100000	0	0	40000	0	16000	0	1200000	90000	10000
216-T-36	0	0	0	0	0	0	1000	0	0	0	0	0	0	0
216-T-5	8000	0	0	0	100000	0	0	0	8000	20000	0	140000	60000	9000
216-T-7TF	170000	0	0	250000	1700000	0	0	40000	0	140000	0	2300000	500000	70000

Figure 3-2. Summary of Operational Periods for Operable Unit 200-TP-1.



The crib also received waste from the 224-T building after sludge buildup in the 201-T through 204-T tanks caused the closing of the 216-T-32 crib. The site was deactivated by capping the pipeline to the crib and rerouting the effluent to the 216-T-19 crib (BHI 1994).

The crib and tile field received 110,000,000 L of high-salt and neutral/basic waste containing 5,170 metric tons of inorganic compounds. Radionuclides include: cesium-137, ruthenium-106, strontium-90, cobalt-60, uranium-238, and plutonium (BHI 1994).

Wells W10-3, W10-59, W10-61, W10-63, W10-67, and W10-68 monitor this crib. Wells W10-69, W10-70, W10-71, W10-72, W10-77, W10-80, and W10-81 monitor the tile field. Scintillation profiles from well W10-3 suggest radionuclides beneath the 216-T-7 crib have moved downward in the sediment column 1.8 m between 1959 and 1976. The data from this well also indicate that break-through to groundwater could have occurred at this site (Fecht et al. 1977).

The crib is located within the 241-T tank farm chain-link fence barricade. The barricade around the tile field consists of a light chain fence that extends west from the tank farm and north of the 216-T-14, 216-T-15, 216-T-16, and 216-T-17 trenches and encloses the 216-T-5 trench. The fence is labeled with both underground and surface contamination signs (site visit by authors, September 1991).

3.3 216-T-21 THROUGH 216-T-24 TRENCHES

This group of trenches is located 250 ft west of the 241-TX tank farm. These units are specific-retention trenches, and received first-cycle supernatant waste from the 221-T canyon building via the 109-TX, 110-TX, and 111-TX tanks. Trench 216-T-21 received 460,000 L of high-salt, neutral basic waste including 93.5 metric tons of inorganic compounds. Trench 216-T-22 received 1,530,000 L of waste containing 293 metric tons of the same compounds as the 216-T-21 trench. Trench 216-T-23 received 1,480,000 L of waste containing 291 metric tons of inorganic compounds. Trench 216-T-24 received 1,530,000 L of waste containing 293 metric tons of inorganic compounds. Radionuclides include: cesium-137, ruthenium-106, strontium-90, cobalt-60, uranium-238, and plutonium (BHI 1994).

The aboveground piping to the trenches was removed and the trenches backfilled when the specific retention capacity was reached. In September 1969, radioactive thistles were found growing above the 216-T-21 and 216-T-24 trenches. In May 1970, all of the trenches were treated with herbicide. The area recovered the vegetative cover by 1977, but no radioactive weeds were discovered (BHI 1994). In addition, no gamma contamination was detected in well W15-81, located just west of the 216-T-22 trench (Fecht et al. 1977).

The site is marked by concrete posts (Hanford photograph A-3). These do not list the individual trenches separately. There was no chain barricade surrounding the site (site visit by authors, September 1991).

3.4 216-T-25 TRENCH

This trench is located immediately north of the 216-T-21 through 216-T-24 trench group, and was active during September 1954 (BHI 1994).

The trench received first-cycle evaporator bottom that consisted of sludge from condensed first-cycle wastes (Stenner et al. 1988) from the 242-T building via the 101-TY and 102-TY tanks. The site received 3,000,000 L of liquid mixed waste containing 2,930 metric tons of inorganic compounds. Radionuclides include: cesium-137, ruthenium-106, strontium-90, cobalt-60, uranium-238, and plutonium (BHI 1994).

The aboveground piping was removed and the trench was backfilled when the trench was deactivated (BHI 1994). The trench is fenced within the same compound as trenches 216-T-21 through 216-T-24 (Hanford photograph A-3). Portions of a concrete pad are visible northeast of the trench. Remnants of a chain barricade separating the pad from the trench lie on the ground (site visit by authors, September 1991).

3.5 216-T-32 CRIB

The 216-T-32 crib is located 250 ft north of 23rd Street and 750 ft west of the 207-T retention basin within the confines of the 241-T tank farm (BHI 1994) (Hanford photograph A-4). The crib consists of two wooden vaults, 40 ft apart. The cribs were fed by a single line leading from the 201-T tank (Hanford drawing H-2-558).

The site received waste from the 224-T building via the 241-T-201 tank in the 241-T tank farm. The crib received 29,000,000 L of transuranic (TRU)-contaminated liquid waste containing 2,616 metric tons of inorganic compounds. Radionuclides include: cesium-137, ruthenium-106, strontium-90, cobalt-60, uranium-238, and plutonium (BHI 1994).

The site was deactivated in May 1952 by blanking the line to the crib. BHI (1994) reports the line to the crib east of the 241-T-151 and 241-T-152 diversion boxes was blanked; however, Hanford drawing H-2-44511, Sheet 134, shows the 201 tank series connected directly to the crib.

The crib is monitored by wells W10-56, W10-57, W10-58, W10-64, W10-65, W10-73, W10-75, and W10-76. Low levels of radiation have been detected between 8 and 35 m below ground surface (Fecht et al. 1977).

3.6 216-T-36 CRIB

The 216-T-36 crib is located 40 ft south of 23rd Street, 200 ft south of the 216-T-7 crib and tile field, and directly south of the 241-T tank farm (Hanford photograph A-5). It was constructed to receive T and U Plant waste after crib 216-T-27 was taken out of service (BHI 1994).

The crib received steam condensate decontamination waste and miscellaneous waste from the 221-T canyon building and 221-U building (BHI 1994). It received 522,000 L of waste including 1 metric ton of nitrate. Radionuclides include: cesium-137, ruthenium-106, strontium-90, cobalt-60, uranium-238, and plutonium (BHI 1994).

The crib is marked by a light chain barricade with surface and underground contamination placards. However, concrete marking posts are absent. Two vent pipes are located at the west end of the crib (site visit by authors, September 1991).

4.0 OPERABLE UNIT 200-TP-2

Operable unit 200-TP-2 encompasses the area south of the T Plant and east of the 241-TX and 241-TY tank farms (Figure 3-1). Geographically it forms the central core of the T Plant Aggregate Area.

Tables 4-1 and 4-2 summarize the sites and UPR locations and waste volumes within the 200-TP-2 Operable Unit. There are two active sites (200-W PP and 241-TX-152) and nine UPRs. Note that the quantity of material disposed at each site is not necessarily directly proportional to either the hazard ranking or the quantity of contaminated soil. The 216-T-19TF and 216-T-28 cribs are the only two sites within the operable unit that scored over two on the Pacific Northwest Laboratory (PNL) Hazard Ranking System (Stenner et al. 1988).

Table 4-3 summarizes some of the parameters that were investigated by the authors during several site visits performed in September and early October 1991. A list of the organic and inorganic contaminants that were part of the waste disposed in the area is given in Table 4-4. This data was extracted from BHI (1994) and has not been validated by the authors. It should be used as guidance only.

Figure 4-1 provides a graphical summary of the operational history of the individual sites. The starting and ending dates are based on data contained in BHI (1994).

4.1 200-W PP POWERHOUSE POND

This active site is located 1,500 ft west of the 284-W building and 60 ft south of diversion box 241-TX-155 (Hanford drawing H-2-34762). Water treatment and steam production wastes are received by the pond. The powerhouse effluents are mainly boiler quench water, basin flush water, water softener backflush, and boiler blowdown (BHI 1994).

The pond is comprised of two 200-ft by 50-ft by 15-ft rectangular basins separated by a narrow concrete channel. The slopes are stabilized with cobbles. Four pipes open at the north headwall and were discharging approximately 10 gal/min into the north basin. Little standing water is present in the basins. In September 1991, the pond was cleaned by using a crane and the spoil was dumped on the northwest side near the 241-TX-152 and 241-TX-155 diversion boxes (site visit by authors, October 1991)

Until 1981, this waste site extended into the 216-U-14 ditch. The connection to the ditch was severed when the northern end of the ditch was stabilized by backfilling.

4.2 216-T-13 TRENCH

The 216-T-13 trench received liquid mixed wastes from vehicle decontamination between June 1954 and June 1964. The trench was located 2,800 ft southwest of the 221-T canyon building and 228 ft south of 23rd Street (BHI 1994).

Table 4-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-2 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
200-W PP	Pond	Active	N41390 W75380	Nonhazardous/Nonradioactive
216-T-13	Trench	Inactive	N42850 W75840 (center)	Mixed Waste
216-T-18	Crib	Inactive	N42647 W75274 (center)	TRU-Contaminated Soil Site/Mixed
216-T-19TF	Crib	Inactive	N41270 W75608 (crib), N41270 W74508, N40870 W75608 (tile field)	Mixed Waste
216-T-20	Trench	Inactive	N41380 W74720 (center)	Mixed Waste
216-T-26	Crib	Inactive	N42445 W75330 (center)	Mixed Waste
216-T-27	Crib	Inactive	N42360 W75330 (center)	Mixed Waste
216-T-28	Crib	Inactive	N42475 W75330 (center)	Mixed Waste
216-T-31	French Drain	Inactive	N41660 W75530 (center)	Mixed Waste
241-TX-152	Diversion Box	Active	N41680 W74800	Mixed Waste
241-TX-155	Diversion Box	Inactive	N41680 W74800	Mixed Waste
241-TX-302B	Catch Tank	Inactive	N41680 W74800	Mixed Waste
UN-200-W-113	Unplanned Release	Inactive	N41450 W74900	Mixed Waste
UN-200-W-135	Unplanned Release	Inactive	N41380 W74720	Mixed Waste
UN-200-W-14	Unplanned Release	Inactive	N42910 W75310	Mixed Waste
UN-200-W-29	Unplanned Release	Inactive	N43163 W75348, N43163 W75468, N43023 W75468, N43023 W75348	Mixed Waste
UN-200-W-99	Unplanned Release	Inactive	N41500 W75200, N40750 W75400	Mixed Waste
UPR-200-W-131	Unplanned Release	Inactive	N41380 W74720	Mixed Waste
UPR-200-W-28	Unplanned Release	Inactive	N41545 W74755	Mixed Waste
UPR-200-W-5	Unplanned Release	Inactive	N41425 W74900	Mixed Waste

Table 4-2. Operational Data and Waste Volumes for Operable Unit 200-TP-2 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
200-W PP	Liquid	August 1984			Top	0	0	0	0	0	0.00	
216-T-13	Liquid	June 1954	June 1964		Bot	20	20	8	0	0	0.00	
216-T-18	Liquid	December 8, 1953	December 21, 1953		Bot	30	30	15	590	1000000	1.60	
216-T-19TF	Liquid	September 1951	July 24, 1980		Top	0	0	0	4500	455000000	57.89	
216-T-20	Liquid	November 1952	November 1952		Bot	10	10	4	2	18900	1.09	
216-T-26	Liquid	August 1955	November 1956		Bot	30	30	15	460	12000000	1.82	
216-T-27	Liquid	September 1965	November 1965		Bot	30	30	15	460	7190000	1.72	
216-T-28	Liquid	February 1960	February 1966		Bot	30	30	15	460	42300000	47.82	
216-T-31	Liquid	October 1954	February 1962		Top	0	0	0	0	0	0.00	
241-TX-152	Liquid	1949	Present		Top	0	0	0	0	0	0.00	
241-TX-155	Liquid	1949	December 1980		Top	0	0	0	0	0	0.00	UPR-200-W-28, -5, -131
241-TX-302B	Liquid	1949	1982		Top	0	0	0	0	0	0.00	
UN-200-W-113	Liquid			Mid 1950's	Top	0	0	0	0	0	0.00	
UN-200-W-135	Liquid			April 5, 1954	Top	0	0	0	0	0	1.20	
UN-200-W-14	Liquid			October 1952	Top	0	0	0	0	0	0.00	
UN-200-W-29	Liquid			November 15, 1954	Top	100	75	0	0	3785	1.04	
UN-200-W-99	Solid			September 1968	Top	0	0	0	0	0	0.69	
UPR-200-W-131	Liquid			March 13, 1953	Top	0	0	0	0	0	0.00	
UPR-200-W-28	Liquid			Spring 1954	Top	100	30	0	0	0	0.00	
UPR-200-W-5	Liquid			1950	Top	0	0	0	0	0	0.00	

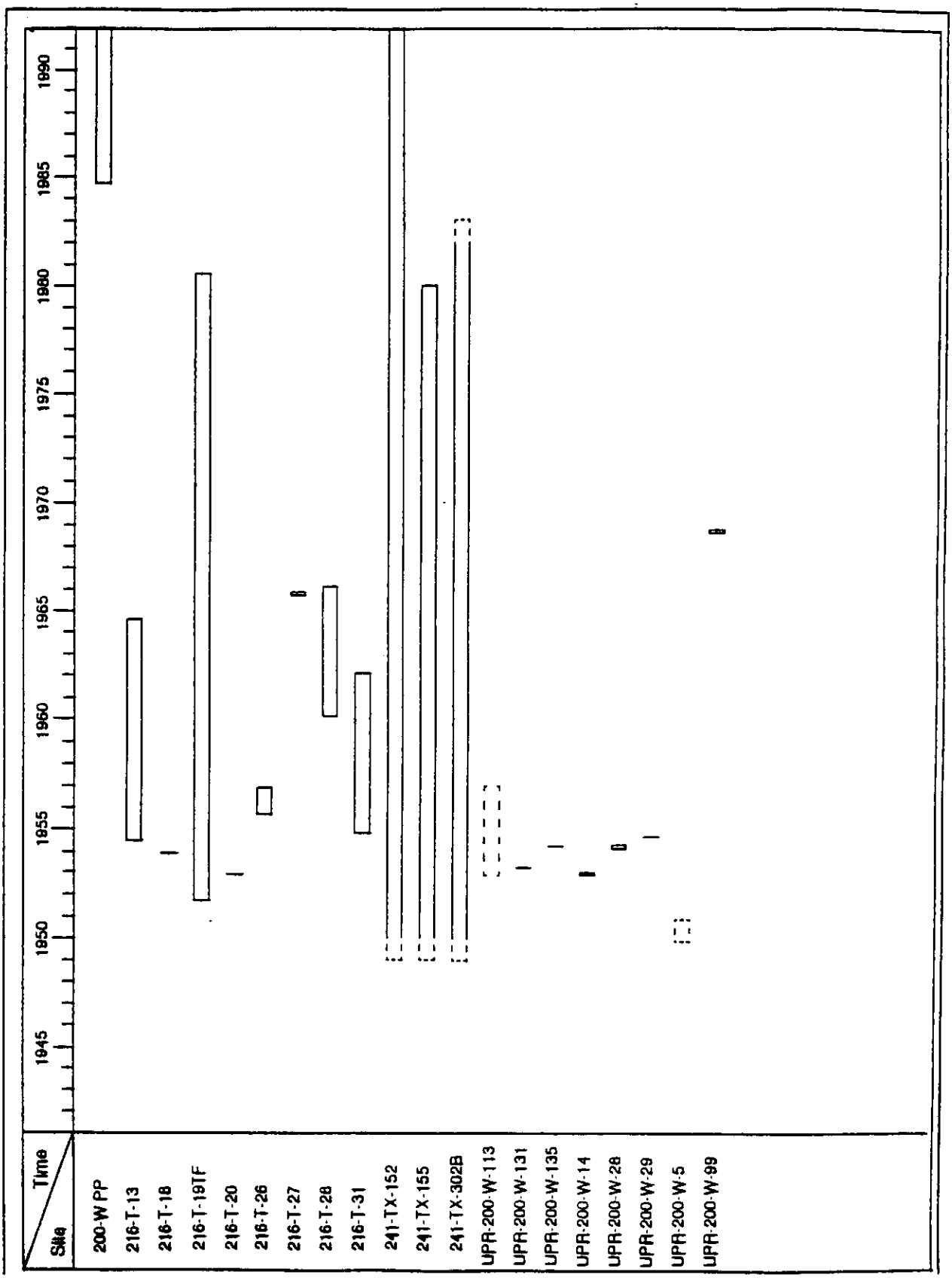
Table 4-3. Summary of Current Site Conditions for Operable Unit 200-TP-2 (BHI 1994).

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
200-W PP	None	None	None	Gravel	0.0	Brush	None	0	
216-T-13	None	None	None	None/Unknown	0.0	Native Grass	None	0	
216-T-18	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	T	None	0	100
216-T-19TF	Light Chain	Surf.+Underground+Cave-in	Concrete Post w/ Plaque	None/Unknown	0.0	None	None	0	4723
216-T-20	None	None	None	None/Unknown	0.0	None	None	0	15
216-T-26	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	4.0	Non-native Grass	None	0	7005
216-T-27	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	4.0	Non-native Grass	None	0	
216-T-28	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	4.0	Non-native Grass	None	0	[illegible]
216-T-31	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	[illegible]
241-TX-152	Light Chain	Surface Contamination	Posted on Structure	None/Unknown	0.0	None	None	0	[illegible]
241-TX-155	Light Chain	Surface Contamination	None	Soil cover/Backfill	0.0	None	None	0	[illegible]
241-TX-302B	Light Chain	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	[illegible]
UN-200-W-113	Temporary Posts	Underground Contamination	None	Soil cover/Backfill	8.0	Non-native Grass	None	0	[illegible]
UN-200-W-135	Temporary Posts	Underground Contamination	None	Soil cover/Backfill	8.0	Non-native Grass	None	0	0
UN-200-W-14	None	None	None	None/Unknown	0.0	Native Grass	None	0	0
UN-200-W-29	None	None	None	Gravel/Soil Cover	0.5	None	None	0	0
UN-200-W-99	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	4.0	Non-native Grass	None	0	0

Table 4-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-TP-2 (BHI 1994).

Site	Fluoride (kg)	FeCN (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	Na Al (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-T-18	2500	0	0	0	60000	8000	8000	0	3200	0	9000	80000	19000	4000
216-T-19TF	0	0	0	0	90000	0	0	0	0	18000	0	150000	60000	9000
216-T-20	0	0	0	0	0	0	0	0	0	0	0	15000	0	0
216-T-26	30000	6000	0	0	700000	100000	100000	0	40000	0	110000	1000000	230000	50000
216-T-27	0	0	0	0	0	0	0	0	0	0	0	1000	0	0
216-T-28	0	0	0	0	0	0	0	0	0	0	0	10000	0	0

Figure 4-1. Summary of Operational Periods for Operable Unit 200-TP-2.



The trench was located approximately 150 ft north of the 241-T tank farm, at the former site of the 269-W garage (Hanford drawing H-2-44511, Sheet 126). The trench was 20 ft by 20 ft by 8 ft deep. The site was excavated in April 1972, and 4 yd^3 of soil were buried in the 200 West Area dry waste burial ground. Emissions up to 1,500 c/m were measured in the excavated soil (BHI 1994).

There are no markers for this trench at the present time. A concrete ramp covered with 2 ft of gravel is visible near the site of the garage. Hanford photograph A-6 depicts a light chain barricade with surface contamination markings for an area immediately north of the 241-TY tank farm, which possibly identifies this site. Currently, an extended area of gravel, approximately 1.5 ft above the grade shown in the photograph, extends approximately 25 ft north of the 241-TY tank farm (site visit by authors, September 1991). However, this light chain barricade may represent an unnumbered, UPR (Shannon, personal communication).

4.3 216-T-18 CRIB

This crib is located 500 ft south of 23rd Street, 250 ft east of Camden Avenue, and north of the 216-T-26, 216-T-27, and 216-T-28 cribs (BHI 1994; Hanford drawing H-2-44510, Sheet 2; Hanford photograph A-7).

The site received 1,000,000 L of first-cycle scavenged tributyl phosphate supernatant waste from the 221-T canyon building between December 8, 1954, and December 23, 1954. The waste includes 194 metric tons of inorganic compounds. The crib was filled through aboveground piping, which was removed when the crib was deactivated at completion of waste discharge. The area was stabilized in May 1990 (Environmental Protection files). The waste is high salt and neutral/basic (BHI 1994). Well 299-W11-11 monitors the crib and indicates that breakthrough to groundwater has not occurred at this site (Fecht et al. 1977). Current conditions are summarized in Table 4-3.

4.4 216-T-19TF CRIB AND TILE FIELD

The crib and associated tile field are located southeast of the 241-TX tank farm, 40 ft west of Camden Avenue (BHI 1994).

The site was active from September 1951 until the line to the tile field was blanked in September 1980. Until July 1955, the site received the process condensate from the waste evaporator in the 242-T building. From July 1955 to December 1955, the site was inactive while the 242-T building was on standby and the waste evaporator was shut down. From December 1955 to August 1956, the site received cell drainage from tank 5-6, second-cycle supernatant waste from 221-T canyon building, and waste from 224-T building. From August 1956 through December 1965, the site was inactive while T Plant operations were shut down. From January 1966 to April 1976, the site received process condensate and steam condensate from the waste evaporator in the 242-T building. The waste evaporator was shut down in 1976. The site received liquid cold-cell drainage from 1976 until 1980. Piping to the site was routed through the 241-TX-153 diversion box, and the 241-TX-302A and 241-TX-302X catch tanks (BHI 1994).

The 242-T waste evaporator started in 1951 to condense first-cycle wastes stored in underground tanks (Stenner et al. 1988). Stenner et al. (1988) reports that through 1956, cell drainage from

tank 5-6, second-cycle supernatant waste from the 221-T canyon building and 224-T building were routed through a cascade of three single-shell tanks (SST) before discharge to the ground (BHI 1994).

The tile field and crib are enclosed within a light chain barricade. The crib is enclosed within a second, inner light chain barricade with cave-in potential, underground, and surface contamination warning signs (Hanford photograph A-8). The crib has a large vent on the north side (site visit by authors, September 1991). A waste line directly to the tile field, bypassing the crib, was installed when part of the crib apparently collapsed (BHI 1994).

4.5 216-T-20 TRENCH

This trench is 750 ft east of Camden Avenue and 750 ft south of 22nd Street (Hanford photograph A-9). It was excavated in November 1952 to receive contaminated nitric acid from the 241-TX-155 diversion box catch tank. It was deactivated the same month by backfilling and removing the aboveground piping (BHI 1994).

The trench received 18,900 L of contaminated nitric acid containing 15 metric tons of nitrate while in operation (BHI 1994).

One additional alias not included in BHI (1994) for this site is the contaminated acid pit, referenced on Hanford drawing H-33305. Currently the site is not marked in any way (site visit by authors, September 1991). An undated aerial photo (Hanford photograph A-10) shows a scar east of 241-TX-155 that may represent the trench. The concrete post that marked the trench was knocked down by equipment, probably in the 1970's (Shannon, personal communication).

4.6 216-T-26 CRIB

This crib is the northernmost crib of the 216-T-26 through 216-T-28 group (Hanford photograph A-11). It is located 200 ft north of 22nd Street and 200 ft east of Camden Avenue. It is east of the 241-TY tank farm (BHI 1994).

This crib received first-cycle scavenged tributyl phosphate supernatant T Plant wastes (Stenner et al. 1988). Chemical additives were used to settle the cesium-137. The waste was routed through the 241-TY-101, 241-TY-103, 241-TY-104 tanks (Stenner et al. 1988; BHI 1994). The crib received 12,000,000 L of liquid mixed waste, including 2,366 metric tons of iron cyanide and other inorganic compounds. The waste is high salt and neutral/basic.

The site was deactivated by blanking the line leading to the 216-T-26 and 216-T-28 cribs, between the 241-TY tank farm and the roadway. Well W11-70 is a shallow monitoring structure that monitors the 216-T-26 crib. Radioactive contaminants were detected from near the ground surface to a depth of 28.9 m. The waste inventory indicates most of the contamination detected in the profiles is cesium-137 (BHI 1994).

A few scattered Russian thistles containing strontium and cesium were found growing each year for the past 10 yr or more on the surface of this site. Some thistles have escaped removal and have deteriorated, contaminating the ground surface. Radiation survey in May 1975 revealed spotty surface contamination to a maximum of 30,000 c/m (BHI 1994).

Remedial action in 1975 consisted of blading off the top 6 in. of soil and disposing it in the 200 West Area dry waste burial grounds, followed by filling with clean fill dirt to the original grade (BHI 1994). The site was stabilized on May 21, 1990 (BHI 1994).

Cribs 216-T-26 through 216-T-28 are currently fenced within a single barricade (Table 4-3). A flush tank is located in the northeast corner of the compound. Two small concrete pads, possibly truck unloading facilities, are located east of the barricaded area (site visit by authors, September 1991).

4.7 216-T-27 CRIB

This crib is located midway between cribs 216-T-26 and 216-T-28, 250 ft north of 22nd Street and 200 ft east of Camden Avenue, within the same radiation zone as the two other cribs (Maxfield 1979). This crib was constructed of steel pipes leading to vertical, open-ended sewer pipe, like 216-T-26, but the piping is 8 ft below grade (BHI 1994).

The crib received 300 Area laboratory wastes from the 340 facility (BHI 1994), PNL waste (via tank truck), and wastes from the 221-T canyon building via the 241-T-111 and 241-T-112 tanks (Isochem 1967). The crib received 7,190,000 L of liquid containing 1 metric ton of nitrate. It was taken out of operation when the radionuclide disposal limit was reached (BHI 1994). Diversion of T Plant waste destined for cribs, and waste transported via tank truck from the PNL 300 Area waste to the 216-T-27 crib was initiated when breakthrough of strontium and cesium to the groundwater under the 216-T-28 crib occurred (BHI 1994). The PNL waste routed to this crib was material generated during a period when a sudden increase (factor of four) of activity occurred. Subsequently, it was determined that this material does not react favorably with soil. Each time waste was pumped to 216-T-27, groundwater samples taken near the 216-T-28 crib increased in radioactivity.

Well 299-W14-53 monitors this crib. Radioactive contaminants detected in the well prior to use of the crib are because waste discharged to the 216-T-28 crib immediately to the south. Discharges to the crib from 1965 to 1970 increased the size of the contaminated zone and the intensity of radiation. In 1976, the radiation intensity began to decrease because of radionuclide decay. On the basis of the scintillation probe profiles, since crib operations were terminated, no measurable movement of radionuclides beneath the 216-T-27 crib has been detected. These data indicate that breakthrough to the groundwater has not occurred at this site (Fecht et al. 1977).

Strontium and cesium contamination was discovered in Russian thistles growing on the site. Stabilization and surface remediation at this crib took place in 1975, along with the 216-T-26 crib. As of October 1989, the site had 2,000 to 50,000 dis/m general contamination, with a direct reading on a riser of 25 mR/h nonsmearable (BHI 1994).

4.8 216-T-28 CRIB

This crib is the southernmost of the 216-T-26 through 216-T-28 group, and is 300 ft north of 22nd Street and 200 ft east of Camden Avenue. Like the other cribs in this group, 216-T-28 is constructed of steel pipes that empty into vertical sewer pipes (BHI 1994).

This crib was active from February 1960 until February 1966, and received liquid mixed waste (BHI 1994). Until February 1963, the site received steam condensate decontamination waste and

miscellaneous effluents from the 221-T canyon building via the 112-T tank in the 241-T tank farm. From February to September 1963, it received the above mentioned waste, and decontamination waste from the 2706-T building. From September 1963 to July 1964, it also received 300 Area laboratory waste from the 340 building. From July 1963 through May 1966, the site received steam condensate decontamination waste and miscellaneous waste from the 221-T canyon building via the 112-T tank and the 300 Area laboratory waste from the 340 facility. The decontamination waste was rerouted from the 2706 building to the 216-T-4 ditch. After May 1966, the site received steam condensate decontamination waste and miscellaneous waste from the 221-T canyon building via the 112-T tank, while the 300 Area laboratory waste was rerouted to crib 216-T-34.

The crib received 42,300,000 L of low-salt, neutral/basic waste including 1 metric ton of nitrate. The crib was deactivated when the prescribed radionuclide disposal limit was reached for this unit. The pipeline to the 216-T-26 through 216-T-28 grouping and the riser for the 300 Area laboratory waste were blanked.

Wells W14-2, W14-3, W14-4, and W-14-53 monitor the crib (Fecht et al. 1977).

Strontium and cesium contamination was discovered in Russian thistles growing on the site. Stabilization and surface remediation took place in 1975, along with the 216-T-26 and 216-T-27 cribs. As of October 1989, the site had 2,000 to 50,000 dis/m general contamination, with a direct reading on riser of 25 mR/h nonsmearable (BHI 1994).

4.9 216-T-31 FRENCH DRAIN

This drain is a registered underground injection well, located inside the 241-TX tank farm fence, 80 ft west of Camden Avenue, and 3,000 ft southwest of the 221-T canyon building (BHI 1994).

This drain was contaminated by steam condensate from a steam line blowout during efforts to unplug a waste line in October 1954. In 1959, the contaminated gravel and soil were removed and buried in the 200 West Area dry burial ground, and the drain was replaced. The site was released from radiation zone status in February 1962 (BHI 1994).

Between diversion boxes 241-TXR-153 and 241-TX-153, inside the tank farm barricade, is a 6-ft-diameter, 1-ft-high steel pipe with a split lid. This may be the drain; however, it is not labeled (site visit by authors, September 1991).

4.10 241-TX-152 DIVERSION BOX

This diversion box is located immediately east of the 241-TX tank farm (BHI 1994, Hanford drawing H-2-44511, Sheet 118). The unit transfers waste solutions from processing and decontamination operations. Quantities are variable according to specific plant operations (BHI 1994).

The diversion box is a reinforced concrete structure with overall dimensions of approximately 10.5 ft by 8 ft by 12 ft deep. The cover block thickness is approximately 2 ft. The box drains to catch station 244-TX, and is equipped with a leak detector that alarms at 244-S (BHI 1994). The lid edges are sealed with 3-in. wide tape (site visit by authors, October 1991)

The box adjoins the 241-TX-155 diversion box. The 241-TX-152 diversion box has a steel-pipe railing with surface contamination signs. In September, trenches and new wiring were observed around the box indicating maintenance or construction. These activities were completed by early October (site visit by authors, October 1991).

4.11 241-TX-155 DIVERSION BOX/UPR-200-W-5, UPR-200-W-28, AND UPR-200-W-131

This diversion box is located approximately 800 ft east of the 241-TX tank farm (BHI 1994). There are no other structures near it (Hanford drawing H-2-44511, Sheet 109).

This unit was constructed in 1949 and used to transfer waste solutions to and from various processing and decontamination facilities. Volumes were variable according to plant schedules (BHI 1994).

UPR-200-W-5, UPR-200-W-28, and UPR-200-W-131 occurred in this diversion box. These UPRs resulted from leaky jumpers or overflow and contaminated the soil around the box. UPR-200-W-28, occurring in 1954, has been the latest release (BHI 1994).

The area around the diversion box was covered with clean soil. The diversion box today is coated with weatherproofing foam. A light chain barricade with surface contamination placards surrounds the diversion box and adjacent 241-TX-302B catch tank. UPR UN-200-W-76, part of operable unit 200-TP-5, occurred in the vicinity of the diversion box (BHI 1994).

This unit has been isolated and weather covered. Leak detection and air monitoring are performed continuously within the tank farm with which this unit is located (BHI 1994).

4.12 241-TX-302B CATCH TANK

This catch tank serves the 241-TX-155 diversion box. It was active from 1949 to 1982. Catch tanks drain diversion boxes and so are affected by the same type of waste (BHI 1994). The tank is enclosed within the light chain boundary surrounding 241-TX-155. Three yellow pipes mark the tank. Two of these pipes are stubbed 1 ft above the ground and one is approximately 5 ft high and equipped with a fluid level recorder (site visit by authors, September 1991).

4.13 UN-200-W-14 UNPLANNED RELEASE

This release occurred along the waste line connecting the 242-T building and the 207-T retention basin.

The leak was noted in October 1952, when contaminated water was observed rising to the ground surface above the waste line. The leak was repaired and the contaminated areas were covered with about 1 ft of clean soil (Baldridge 1959).

The contaminants were not identified, but since 242-T was the source of the stream, the material probably has a similar composition to the liquid discharged to the cribs.

This site is not marked, and the area indicated by the coordinates in BHI (1994) shows no sign of stabilization (site visit by authors, September 1991).

4.14 UN-200-W-29 UNPLANNED RELEASE

This UPR was caused by a failure in an unencased line that contaminated the surrounding area. The line that failed connects the 241-T-152 and the 241-TX-153 diversion boxes.

The leak consisted of first-cycle supernatant waste that was being transferred from tank 241-T-105 to tank 241-TX-118 via the 241-T-152 and 241-TX-153 diversion boxes on November 15, 1954 (Radiological Sciences Department, 1954b; Short 1954). The leak was noted by a radiation technician searching for the source of high background readings at the 269-W garage. The technician discovered a small cave in and runoff of contaminated liquid in an area of 75 ft by 100 ft on the east side of Camden Avenue. Approximately 1,000 gal leaked, and generated dose rates of 11.5 R/h at 2 in. (Short 1954). The waste included rare earth elements (BHI 1994).

The runoff area was hosed down with water to prevent wind-borne spread of contamination (BHI 1994) and the leak area was backfilled shortly after the leak was discovered (Radiological Sciences Department, 1954b). In 1978, contaminated soil adjacent to the zone was removed on the south side to a depth of 4 ft and on the west side to a depth of 3 ft. The entire zone area was excavated to depth of 1 ft, the new surface was then treated with a heavy coating of fiberfilm to seal against moisture penetration. It was covered with 4 in. of sand and was treated with ureabore herbicide. All surfaces were covered with 4 in. of crushed rock to stabilize against wind dispersal. The area was backfilled with earth and later covered with gravel (BHI 1994).

In May 1966, a spill occurred at the same location (UPR-200-W-97). In that incident, the same leaking line was mistakenly used (BHI 1994).

4.15 UN-200-W-99 UNPLANNED RELEASE

This UPR covers an area 250 yd north and south along Camden Avenue and extending from 75 to 100 yd east of Camden Avenue (BHI 1994).

The contamination resulted from airborne contamination emanating from the 241-TX-153 diversion box. Two plumes containing strontium-90 floated northeast and southeast of the diversion box presumably when jumpers were moved on September 22, 1966. Readings ranged from 20,000 to 100,000 c/m, some particles reached 700 mrad/h (BHI 1994).

The road contamination was covered with a new tar mat, the sides of the roads were "fixed" with tar, and the field to the east of Camden Avenue was turned over to cover 95% of the particulate contamination. Test plots dug in the fall of 1976 showed strontium-90 particulate matter is still present (BHI 1994).

The area between Camden Avenue and the 241-TX tank farm is covered with gravel, and east of Camden Avenue an area adjoining the road and extending north the length of the farm is barricaded and labeled as 216-UN-W-7. This area is stabilized with soil, sown with grass, and marked with underground contamination signs (site visit by authors, September 1991).

4.16 UN-200-W-113 UNPLANNED RELEASE

This area extends from 700 ft east of the 241-TX tank farm, just north of the 241-TX-155 diversion box (BHI 1994).

The site was discovered in 1977, when radioactive rabbit feces were found near the 241-TX-155 diversion box. The radiation survey found low-level beta/gamma ground surface contamination on the hillside below and to the west of the diversion box. As the soil was removed, radioactivity increased and the source was thought to be a leak in a waste transfer line. An acid spill from the diversion box catch tank is also a possible influence (BHI 1994). An encasement connecting the 241-TX tank farm and the 241-TX-155 diversion box is located near the zone (Hanford drawing H-2-44511, Sheet 109).

The date of the leak is unknown but is thought to have occurred in the 1950's (see UN-200-135). The site was stabilized with clean gravel. The release is located within the UN-216-W-23 compound and monitored by Health Physics technicians. They indicate that before stabilization in December 1990 radiation up to 20,000 beta dis/m were encountered. At the present time the area is now below detectable limits (Mikulecky, personal communications). The area is stabilized with soil, sown with grass, and posted with underground radiation hazard signs (site visit by authors, September 1991).

This UPR site has had two stabilization efforts made. The most recent being in June 1990. Before stabilization, there were measurements of 20,000 dis/m direct beta radiation. All other measurements were below detection limits. Since the most recent stabilization, all measurements have been below detection (Health Physics Survey, No. 902133).

4.17 UN-200-W-135 UNPLANNED RELEASE

This UPR covers an area of approximately 12 ft^2, approximately 150 ft northwest of the 241-TX-155 diversion box. A cave in (2 ft^2), which appeared to have held a pool of water, was noted along the encasement that connects the diversion box to the 241-TX tank farm. A jumper in the diversion box apparently failed and allowed liquid to flow along the encasement and exit on a hillside. The jumpers are connected to a catch tank, but the tank was known to leak (Manufacturing Department, 1954).

The leaking connector was shunting blended-metal supernatant waste from 244-UR to 241-WR when the leak occurred, sometime after March 27, 1954. It is believed that approximately 1,000 gal leaked (Manufacturing Department, 1954). BHI (1994) estimates the contaminant volume at 60,000 ft^3.

A dose rate of 5 R/h including 2.5 R/h at 3 ft was observed at the cave in, and later a dose rate of 300 R/h at 4 in. above the major collection point (Radiological Sciences Department, 1954a). After discovery, access roads into the area were barricaded until the contamination was covered. The contamination area was sealed and covered with earth (BHI 1994).

The area of the spill is enclosed within the UN-216-23 (UN-200-W-113, Section 4.16) area (Hanford drawing H-2-34762). This area is described under the UN-200-W-113 heading. The UN-200-W-135 is not separately barricaded (site visit by authors, October 1991).

5.0 OPERABLE UNIT 200-TP-3

Operable Unit 200-TP-3 contains 11 sites and two UPRs. This unit and Operable Unit 200-TP-4 form the northern boundary of the T Plant Aggregate Area (Figures 1-1 and 5-1). The unit is surrounded on three sides by the 218-W burial grounds. The largest feature in the unit is a surface pond and drainage ditch (Figure 5-1). The pond, drainage ditch, and the 207-T retention basin have been operating since 1944 (Figure 5-2). All other sites within the operable unit operated for very short periods of time. Table 5-1 provides site locations and waste types for Operable Unit 200-TP-3.

Despite the disposal of large quantities of waste, particularly in the 216-T-4A pond, none of the sites within this operable unit is ranked as posing a significant hazard (Table 5-2) (Stenner et al. 1988). A summary of the current site characteristics, as observed by the authors during several site visits in September and October 1991, is given in Table 5-3. Note, the absence of an area definition for either the extent of surface contamination or radiation zone does not mean hazards do not exist. A zero only signifies that the Health Physics department does not retain this data in their files.

Table 5-4 provides a listing of the inorganic and organic contaminants identified at various sites within the operable unit. This data is extracted from BHI (1994) and has not been validated by the authors. The fact that only a few sites are listed does not indicate that these contaminants are insignificant. It only indicates that the data collection effort at the site pertaining to organic and inorganic compounds has not been as extensive in the past as the data collection effort for radionuclides.

5.1 207-T RB RETENTION BASIN

This basin is an active site approximately 1,500 ft west of the 221-T canyon building, 200 ft north of 23rd Street. The site is a 246-ft by 123-ft by 6.5-ft deep concrete retention basin with inlet and outlet structures on the east and west sides (BHI 1994). It is divided by a concrete spillway into a northern and southern half. Approximately 6,000 ft of 24-in.-diameter vitrified clay pipe conveys waste to the basin (BHI 1994).

The site was constructed in 1944 to receive potentially low-level wastes before discharge to the 216-T-4-2 ditch. It receives T Plant process cooling and ventilation steam condensate. From construction completion to the 1950's, the site received process cooling water from equipment jackets in the 221-T canyon building and 224-T building. From the early 1950's to 1955, and again from 1965 to the late 1960's, and from 1973 to 1976 the basin received the above process waste and 242-T waste evaporator cooling water. Since 1976, the site has received intermittent flow from the 221-T canyon building, 221-TA, and 224-T buildings (BHI 1994).

The sludge and sand at the basin bottoms have low-level mixed fission products and the ground around the basin is generally contaminated with low-level beta-gamma activity resulting from particulate fallout associated with unloading incidents concerning trucked-in waste from the 241-T tank farm (BHI 1994). The basins were cleaned out in the 1950's through the early 1960's by removing the sludge and blown-in sand and burying it in scooped out holes 8 to 10 ft deep along the east side of the basins.

Figure 5-1. Operational Units 200-TP-3, 200-TP-6, and 200-ZP-3 (Partial) Site Plan.

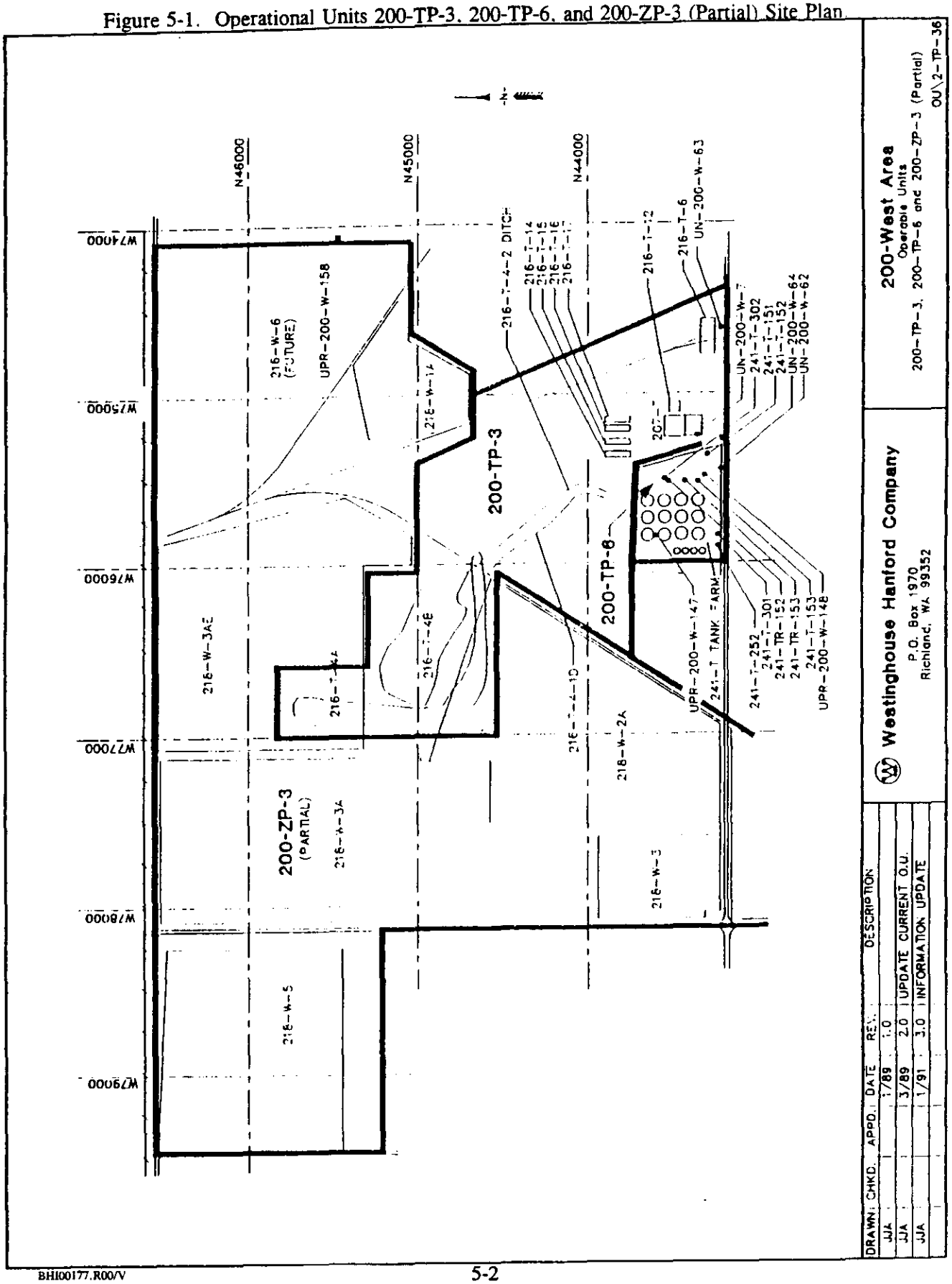


Figure 5-2. Summary of Operational Periods for Operable Unit 200-TP-3.

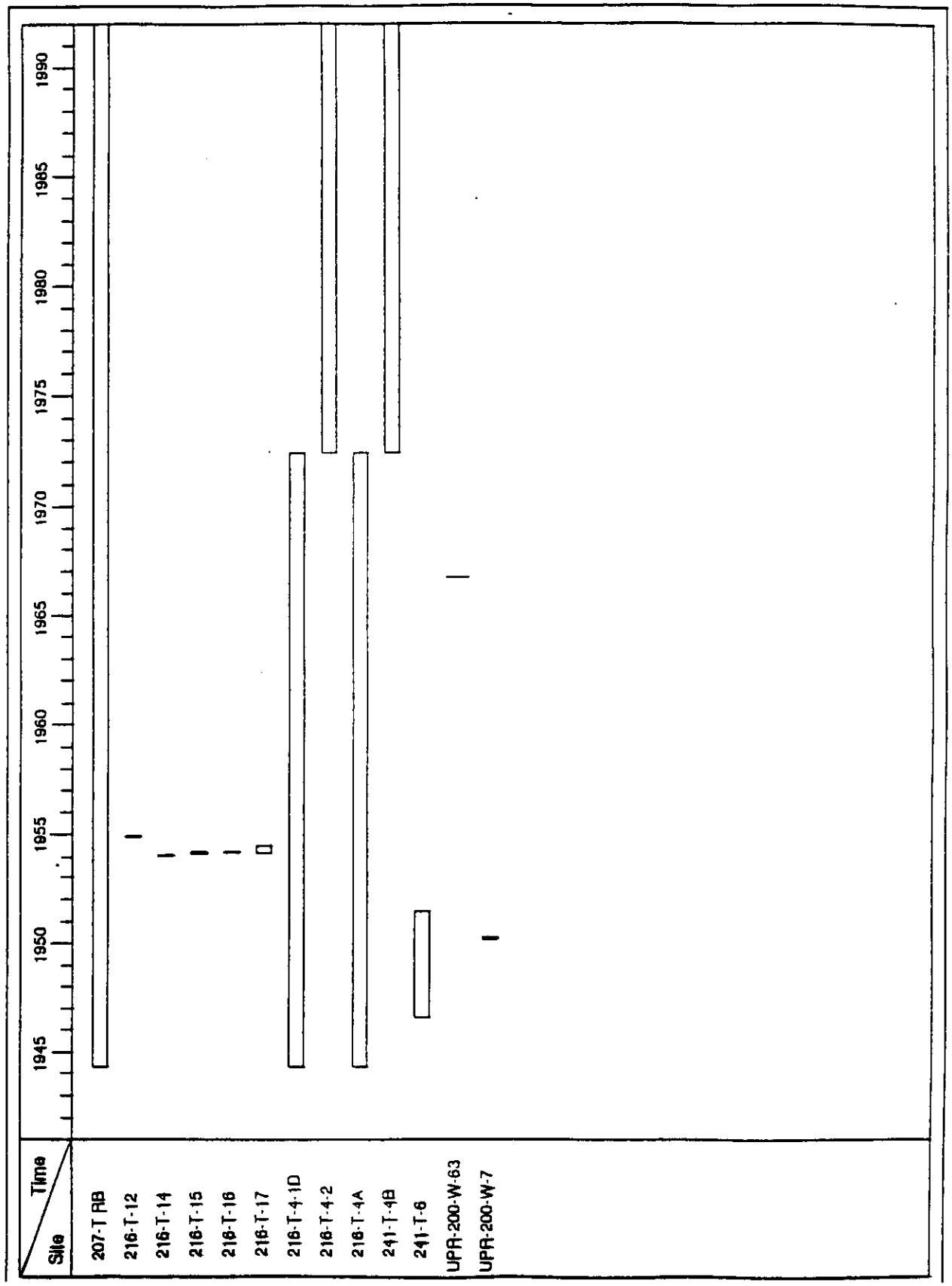


Table 5-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-3 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
207-T RB	Retention Basin	Active	N43600 W75200	Low-Level Waste
216-T-12	Trench	Inactive	N43560 W75140 (center)	Mixed Waste
216-T-14	Trench	Inactive	N43740 W75250, N43960 W75250 (centerline)	Mixed Waste
216-T-15	Trench	Inactive	N43740 W75165, N43980 W75165 (centerline)	Mixed Waste
216-T-16	Trench	Inactive	N43740 W75075, N43980 W75075 (centerline)	Mixed Waste
216-T-17	Trench	Inactive	N43740 W75025, N44015 W75025 (centerline)	Mixed Waste
216-T-4-1D	Ditch	Inactive	N44000 W75640, N45625 W76000 (centerline)	Mixed Waste
216-T-4-2	Ditch	Active	N44000 W75630, N45350 W76700	Low-Level Waste
216-T-4A	Pond	Inactive	N44850 W76950 (SW cnr), N44900 W75925 (SE cnr), N46200 W76750 (north)	Mixed Waste
216-T-4B	Pond	Active	N45200 W76750 (center)	Low-Level Waste
216-T-6	Crib	Inactive	N43315 W74525 (center of #2), N43315 W74463 (center of #1)	TRU-Contaminated Soil Site/Mixed
UN-200-W-63	Unplanned Release	Inactive	N43215 W74615	Mixed Waste
UN-200-W-7	Unplanned Release	Inactive	N43350 W75250	Mixed Waste

Table 5-2. Operational Data and Waste Volumes for Operable Unit 200-TP-3 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR
207-T RB	Liquid	November 1944	Present		Top	246	123	7	0	0	0.00	
216-T-12	Liquid	November 1954	November 1954		Bot	15	10	8	10	5000000	0.98	
216-T-14	Liquid	January 1954	January 1954		Bot	275	10	10	110	1000000	1.20	
216-T-15	Liquid	January 1954	February 1954		Bot	275	10	10	120	1000000	1.20	
216-T-16	Liquid	February 1954	February 1954		Bot	275	10	10	120	1000000	1.20	
216-T-17	Liquid	February 1954	June 1954		Bot	275	10	10	120	785000	1.20	
216-T-4-1D	Liquid	November 1944	May 1972		Bot	850	8	4	890	0	0.00	
216-T-4-2	Liquid	May 1972	Present		Bot	1750	8	4	890	0	0.00	
216-T-4A	Liquid	November 1944	May 1972		Top	1800	600	4	24000	42500000000	0.00	
216-T-4B	Liquid	May 1972	Present		Top	1800	600	4	24000	0	0.00	
216-T-6	Liquid	August 1946	June 1951		Top	28	28	25	290	45000000	2.51	
UN-200-W-63	Liquid			September 21, 1966	Top	0	0	0	0	0	1.04	
UN-200-W-7	Liquid			Spring 1950	Top	0	0	0	0	0	0.00	

Table 5-3. Summary of Current Site Conditions for Operable Unit 200-TP-3 (BHI 1994).

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zc (sq ft)
207-T	Light Chain	Surface Contamination	Could not determine	None/Unknown	0.0	T	None	0	
216-T-12	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	
216-T-14	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	
216-T-15	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	
216-T-16	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	
216-T-17	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Soil cover/Backfill	2.0	Non-native Grass	None	0	
216-T-4-1D	Light Chain	Surface Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	Cattails/Brush/Grass	None	0	
216-T-4-2	Light Chain	Surface Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	Cattails/Brush/Grass	None	0	
216-T-4A	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	Abuts Adjac. Site	0	
216-T-4B	Light Chain	Surface Contamination	None	None/Unknown	0.0	Brush/Grass	Abuts Adjac. Site	0	
216-T-6	Light Chain	Surf.+Underground+Cave-in	Concrete Post w/ Plaque	None/Unknown	0.0	Native Grass	None	5313	53
UN-200-W-63	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	
UN-200-W-7	Chain-Link Fence	Surface Contamination	None	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	

Table 5-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-TP-3 (BHI 1994).

Site	Fluoride (kg)	FeCN (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	Na Al (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrite (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-T-14	2500	0	0	0	60000	8000	8000	0	3200	0	9000	80000	19000	4000
216-T-15	2500	0	0	0	60000	8000	8000	0	3200	0	9000	80000	19000	4000
216-T-16	2500	0	0	0	60000	8000	8000	0	3200	0	9000	80000	19000	4000
216-T-17	2000	0	0	0	50000	7000	6000	0	2500	0	7000	60000	15000	3100
216-T-4-2	0	0	0	0	0	0	0	0	0	0	0	1	0	0
216-T-6	24000	0	0	0	160000	0	0	6000	0	2600	0	180000	13000	1500

The buried sludge was covered with 3 to 4 ft of soil. There may be three or four such holes in addition to the listed 216-T-12 site (BHI 1994).

On September 12, 1985, 500 gal of solution containing 219 lb of sodium hydroxide was released to the basins. After 6 h of continued condensate discharge, the pH lowered from 12.5 to 7.67, and no further action was taken (BHI 1994).

Currently, the basin is enclosed with a light chain barricade that extends east to the 216-T-14 through 216-T-17 trenches, and north of the T tank farm. This is the 216-T-31 area monitored by Health Physics technicians. The area has spotty surface contamination.

In October 1991, drilling had begun at the northwest corner of the 207-T retention basin and the northeast corner of the T tank farm. Nylon barricades with surface contamination placards have been moved around the west perimeter of the 207-T retention basin and the east perimeter of the T tank farm, closing access from 23rd Street. Health physics survey drawings of UN-216-W-31 show a barrier extending straight across the space dividing the tank farm and basin, suggesting that the barricades have been moved to accommodate the drillers.

About 300 ft northeast of the 207-T retention basin, there is a new looking radiation zone. It is about 40 ft by 20 ft and is barricaded with nylon rope. It is marked with surface radiation contamination warning signs. The site is just west of well 299-W11-27 (site visit by author, October 1991). This site was probably found during the routine survey prior to drilling the nearby well (Nelsen, personal communication).

5.2 216-T-4-1D DITCH

The 216-T-4-1D ditch begins 760 ft north of 23rd Street, 2,432 ft west of the 221-T canyon building at a headwall, and 600 ft northwest of the 207-T retention basin. The bottom dimensions are about 850 ft by 8 ft by 4 ft (BHI 1994).

This ditch was active from November 1944 until May 1972, when the 216-T-4-2 ditch replaced it. The ditch conveyed wastewater from 221-T canyon building and 207-T retention basin to the 216-T-4 pond (Maxfield 1979).

The site received 41.9 billion L of process cooling water and steam condensate from 221-T canyon building and 242-T waste evaporator (Maxfield 1979). Until September 1951, it received process cooling water from the 221-T canyon building and 224-T building via the 207-T retention basin, and steam condensate from the 221-T canyon building. From September 1951 until July 1955, it also received condenser cooling water and steam condensate from the 242-T evaporator. From July 1955 until August 1956, the site received the same type of waste as before September 1951. From August 1956 until June 1957, the site received steam condensate from the 221-T canyon building. The unit was on standby from June 1957 to July 1964. From July 1964 until December 1965, it carried decontamination waste from 2706-T and condenser cooling water from the 242-T building. From November 1970 to its closure in May 1972, it only carried cooling water from the 242-T building (BHI 1994).

The bottom of the ditch was contaminated to a maximum of 20,000 c/m, and was greatly overgrown with plants and trees. The berm from the replacement 216-T-4-2 ditch was used to cover this ditch. The total plutonium present in the ditch is estimated to be 1.41 g (BHI 1994).

Currently, the ditch extends only to the railroad tracks. It is approximately 30 ft wide and has brush and cattails growing in it (Hanford photograph A-12). It is demarcated by a light chain barricade (site visit by authors, September 1991).

5.3 216-T-4-2 DITCH

This ditch was constructed to replace the 216-T-4 ditch. It begins at the outfall of the pipe from the 207-T retention basin, which is approximately 600 ft northwest of the basin. The first 50 ft of this ditch is common with the older ditch (BHI 1994) (Hanford photograph A-13).

The ditch was constructed in May 1972, and is still active. The ditch is about 1,750 ft by 8 ft by 4 ft deep, and receives both steam condensate and condenser cooling water from the 242-T evaporator and nonradioactive wastewater from the 221-T canyon building air conditioning filter units and floor drains (BHI 1994).

A survey conducted in January 1978, showed the ditch to be free of radioactivity except for the first 50 ft, which is the portion that coincides with the old ditch (BHI 1994).

5.4 216-T-4A POND

This pond is located 100 ft northwest of the burial grounds railroad spur and 1,350 ft southeast of the northwest corner of 200 West Area. Water formed an L-shaped shallow pond covering 16 acres (BHI 1994) (Hanford photograph A-14).

The pond received 4.25 billion L of liquid between November 1944 and May 1972, when it was backfilled. The chemical waste history is the same as for the 216-T-4-1 ditch. A number of leaks in the 221-T canyon building released radioactivity to this unit over the years. Radiation readings taken along the shoreline after the shutdown of 221-T canyon building ranged from 2,000 to 15,000 c/m (BHI 1994).

The unit was deactivated in 1972 by backfilling. In 1973, 6 to 9 in. of soil was removed from the entire bottom surface of the unit and placed in the 218-W-2A burial ground. The pond was then covered with clean soil. In 1975, the bottom of the pond was seeded with grass to stabilize the surface (BHI 1994).

5.5 216-T-4B POND

This currently active pond was constructed in 1972, 200 ft east of the older 216-T-4A pond, and 450 ft east of the 218-W-3A burial ground.

BHI (1994) gives the pond dimensions as 1,800 ft by 600 ft by 4 ft deep, but gives the description as a 1.5 acre site ranging from 3 to 6 ft deep, 1,759 ft long and 8 ft wide. The pond is fed by the

216-T-4-2 ditch. It is separated from 216-T-4A by an earth dike 1,300 ft long with an average height of 1.5 ft. The pond is designed to receive steam condensate and condenser cooling water from the 242-T evaporator and nonradioactive wastewater from the 221-T canyon building air conditioning filter units and floor drains. However, flow into the ditch is low, and liquid does not reach the pond. The pond has been considered dry since 1977 (BHI 1994).

The site has 24,000 m^3 of contaminated soil. The radionuclide inventories for 216-T-4A and 216-T-4B are reported as one site under the designation of 216-T-4 (BHI 1994) (see Hanford photograph A-13).

5.6 216-T-6 CRIBS

This is a pair of cribs located about 150 ft north of 23rd Street and 1,250 ft west of the 224-T building, just west of the 216-T-3 reverse well (Hanford photograph A-15).

The two cribs were built in August 1946, and were active until June 1951. The 12-ft by 12-ft wooden cribs are 62 ft apart (BHI 1994), and are placed in an excavation with 14 ft by 14 ft bottom dimensions (Hanford drawing H-2-353). The liquid release point is 16 ft below grade. Crib 1 was designed in such a way that any overflow would discharge into crib 2 (BHI 1994).

Until October 1946, the site received cell drainage from tank 5-6 in the 221-T canyon building and waste from the 224-T building via the overflow from the 241-T-361 settling tank. From October 1946 to June 1951, the site received cell drainage from the 5-6 tank. After the 241-T-361 settling tank was deactivated, the 224-T building effluent was rerouted to the 216-T-32 crib (BHI 1994). The cribs were deactivated by blanking the pipe south of the 241-T-361 settling tank (BHI 1994).

The cribs received 45,000,000 L of waste, including 387 metric tons of ammonium nitrate, fluoride, nitrate, phosphate, sodium, sodium oxalate, and sulfate. Radionuclides include cobalt-60, strontium-90, ruthenium-106, cesium-137, uranium-128, and plutonium (BHI 1994).

Well W11-1 and wells W11-54 through W11-67 monitor the two cribs. Most of the radioactive contaminants are concentrated beneath crib 1 in the upper 15.5 m of the sediment column (Fecht et al. 1977). Plutonium contamination was detected as much as 20 ft below the bottom of the cribs and had spread laterally about 45 ft as of 1947. Fission products had penetrated to a depth of 107 ft below the bottom of the crib and spread laterally 95 ft (BHI 1994).

The cribs are marked by two 14-ft by 14-ft light chain barricades enclosed within a 200-ft by 80-ft barricade. A labeled concrete post identifies the cribs. The barricades are labeled with cave-in potential, and underground and surface radiation warning signs (site visit by authors, September 1991).

5.7 216-T-12 TRENCH

The 216-T-12 trench is an inactive waste site located about 300 ft north of 23rd Street and 1,800 ft west of the 224-T building (Maxfield 1979). The unit received 5,000,000 L of contaminated sludge from the 207-T retention basin (Stenner et al. 1988). Activity of the sludge reads a maximum of

15 mR/h at the time of burial. The radioisotopes thought to be present are: cesium-137, ruthenium-106, and strontium-90 (Maxfield 1979).

The site was deactivated when the removal of sludge from the retention basin had been completed by backfilling with clean soil (Maxfield 1979).

This trench is enclosed within the light chain barricade that surround 207-T retention basin and the 216-T-14 through 216-T-17 trenches (Hanford photograph A-16). The site is not marked. Boyd Shannon (personal communication) reported that he has probed extensively for this trench and could not locate it.

5.8 216-T-14 THROUGH 216-T-17 TRENCHES

These trenches are inactive waste sites located approximately 2,000 ft west of the 224-T building and 50 yd north of the 207-T retention basin (Maxfield 1979). Trenches 216-T-14, 216-T-15, and 216-T-16 received 1,000,000 L of waste and trench 216-T-17 received 785,000 L of the first-cycle supernatant waste from the 221-T canyon building via the 241-T-104, 241-T-105, and 241-T-106 tanks in the 241-T tank farm. The waste is high salt and is neutral/basic (Stenner et al. 1988). The radioisotopes thought to be present are: cesium-137, ruthenium-106, and strontium-90 (BHI 1994). The inorganics known to be discharged to these locations are: fluoride, nitrite, phosphate, sodium, sodium aluminate, sodium hydroxide, sodium silicate, and sulfate (Stenner et al. 1988).

The sites were deactivated after they reached the prescribed liquid waste volume for the specific retention trench. The aboveground piping was removed and the unit backfilled (Maxfield 1979).

In May 1970, radioactive Russian thistles were found growing on these units and had a maximum reading of 15 mR/h. To clean these sites, the weeds were removed and the entire surface of the radiation zone was treated with Trisden-dimethylamine salts of Trichlor Obenzonic. The herbicide treatment was completely effective until the summer of 1976, when a few nonradioactive weeds appeared (Maxfield 1979).

These trenches are enclosed within a light barricade (Hanford photograph A-17). Labeled concrete posts identify the trenches (site visit by authors, September 1991). Approximately 200 ft east of the trenches and across the railroad tracks, is a temporary drill rig area exclusion zone and three surface contamination sites. Two of the surface contamination zones are "spot" contamination marked by a small enclosure. The third zone is about 40 ft by 20 ft and encloses several small yellow plastic radiation flags (site visit by author, September 1991).

5.9 UN-200-W-63 UNPLANNED RELEASE

This UPR occurred on September 21, 1966, at a location extending from 500 ft west of the west railroad crossing on 23rd Street to Bridgeport and 23rd Street. Spotty contamination was found along 23rd Street and shoulder from the 241-TX-153 diversion box jumper (Stenner et al. 1988). The waste material contained strontium-90 with readings of approximately 1 Ci and spread from a used diversion box jumper as it was being transported via truck from the 200 West Area dry waste burial ground to

the 221-T canyon building. The jumper had just been removed from the 241-TX-153 diversion box (Maxfield 1971).

The contamination (maximum 500 mR/h) on the road was removed while the contamination on the shoulder of the road and in an adjacent borrow pit was covered with 6 in. of soil (Maxfield 1971). The area was removed from radiation zone status in November 1972 (Maxfield 1973). Currently, there are no markers or signs of stabilization in the area (site visit by authors, September 1991).

5.10 UN-200-W-7 UNPLANNED RELEASE

This UPR resulted from work done on the 241-T-151 and 241-T-152 diversion boxes in 1950. Some contaminated soil was removed and the remainder covered with 1 ft of clean soil (BHI 1994).

No markers or barriers mark this site. The area around the boxes is covered with gravel, like the rest of the farm. Gravel extends from the fence outward several ft (site visit by authors, September 1991).

6.0 OPERABLE UNIT 200-TP-4

Figure 6-1 shows the general layout of Operable Unit 200-TP-4, including the location of selected UPRs. This operable unit is in the northeast corner of the T Plant Aggregate Area and contains both the T Plant canyon building and the plutonium storage facility. T Plant is currently being used as a decontamination facility, therefore several of the sites within this operable unit are still active (Figure 6-2). Some of these sites have been in continuous use since early 1944.

A summary of the general characteristics of each site, including the type of waste disposed, site dimensions, and PNL hazard rank is given in Tables 6-1 and 6-2. Although there are 17 sites and 19 UPRs within this operable unit most pose no significant hazard. Only three sites, two reverse wells, and crib 216-T-8 have been ranked as posing a significant hazard (Table 6-2).

Table 6-3 summarizes some of the surface characteristics of each site that were screened during several site visits by the authors during September and October 1991.

6.1 216-T-1 DITCH

This is an active site. The headwall is located approximately 80 ft north of the 221-T canyon building. The ditch is fed by two below grade pipes that discharge at the headwall. Until June 1956, the ditch received miscellaneous waste from pilot plant experimental work, intermittent decontamination waste, and waste from the head end of the 221-T canyon building. Production operations at the 221-T canyon building were shut down in 1956 and the ditch remained inactive from June 1956 through January 1964, when it started receiving cooling water from the blowdown vessel in T Plant and miscellaneous waste from PNL head-end operations (BHI 1994). Since June 1970, the site has been receiving the condensate from steam-heated radiators at the head end of the 221-T canyon building. End waste from the 221-T canyon building is no longer discharged to the ditch (Lundgren 1970).

The site also receives sodium hydroxide wash water waste solution (less than 1,000 gal/mo). This wastewater is nonradioactive and it only wets the bottom of the ditch out to approximately 150 ft from the outfall (Maxfield 1979). Thick growth of surface vegetation in the ditch prevents the small amount of remaining radioactivity from becoming airborne (Maxfield 1979).

During a site visit by the authors (September 1991) the ditch was barricaded by a light chain and surface contamination markings were posted. The bottom of the ditch was covered with Russian thistle and the banks were heavily vegetated (Hanford photograph A-18).

6.2 216-T-2 REVERSE WELL

The 216-T-2 reverse well is an inactive waste site located within 15 ft of the southwest corner of the 222-T building (Maxfield 1979). The unit is a registered underground injection well that received 6,000,000 L of decontamination sink waste and sample slurper waste from the 222-T building (Stenner et al. 1988; DOE-RL 1988). The pipeline is blanked at the well. The waste has a moderate level of activity and a small area of infiltration (Maxfield 1979). After the pipeline was blanked the effluent was rerouted to the 216-T-8 crib (Lundgren 1970).

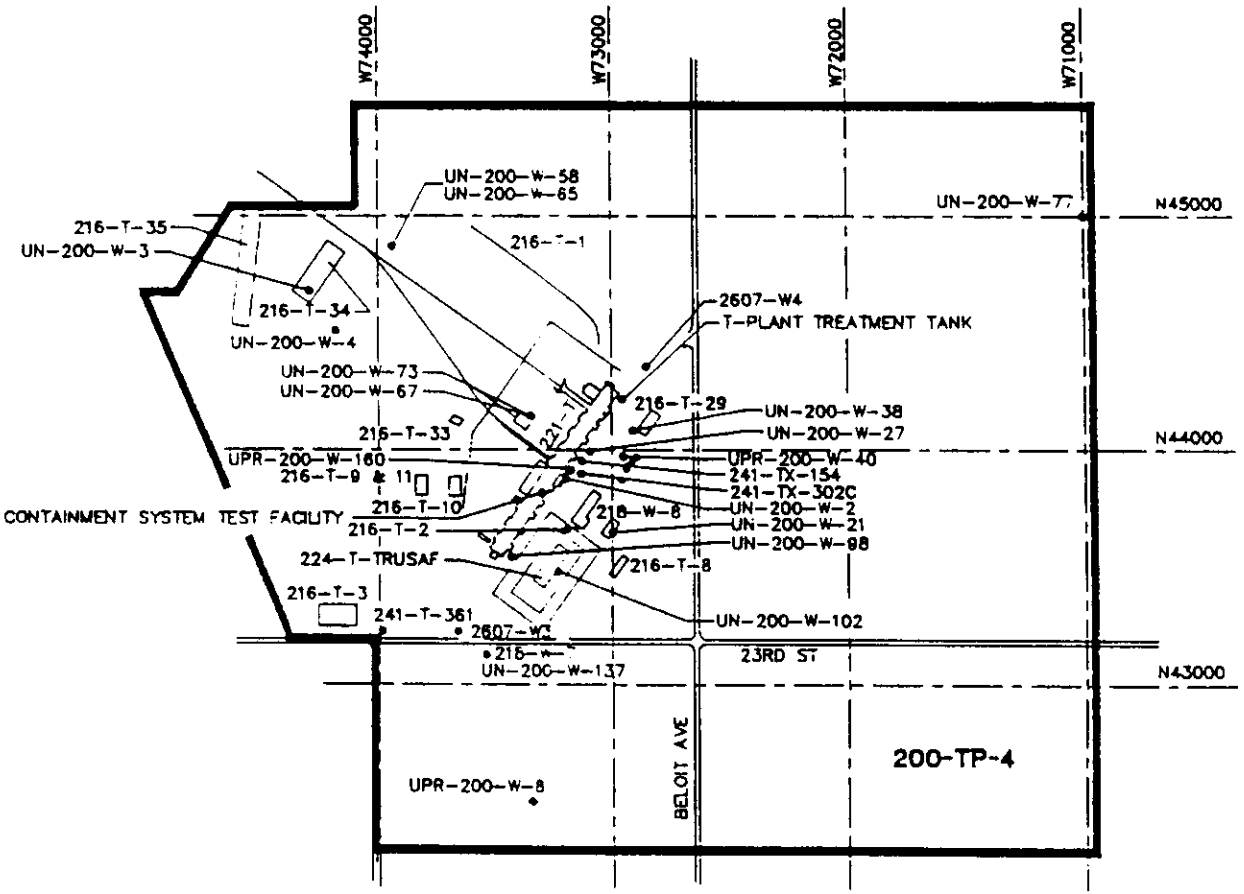


Figure 6-1. Location Map for Operable Unit 200-TP-4.

DRAWN	CHKD.	APPD.	DATE	REV.	DESCRIPTION
JJA			1/89	1.0	
JJA			1/91	2.0	INFORMATION UPDATE

Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

200 West Area
Operable Unit 200-TP-4
OU\2-TP-4

Figure 6-2. Summary of the Operational Periods for Operable Unit 200-TP-4.
(sheet 1 of 2)

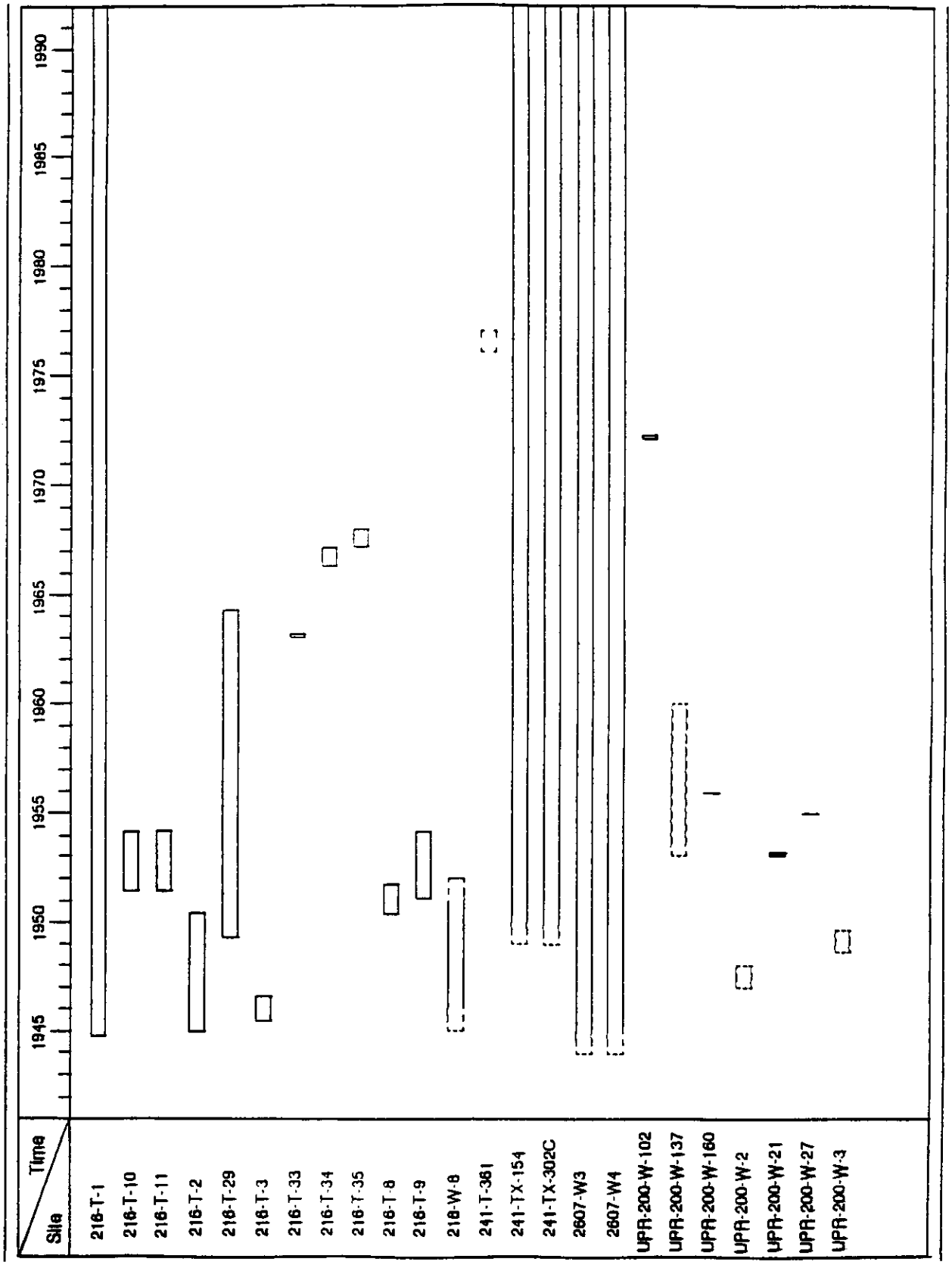


Figure 6-2. Summary of the Operational Periods for Operable Unit 200-TP-4.
(sheet 2 of 2)

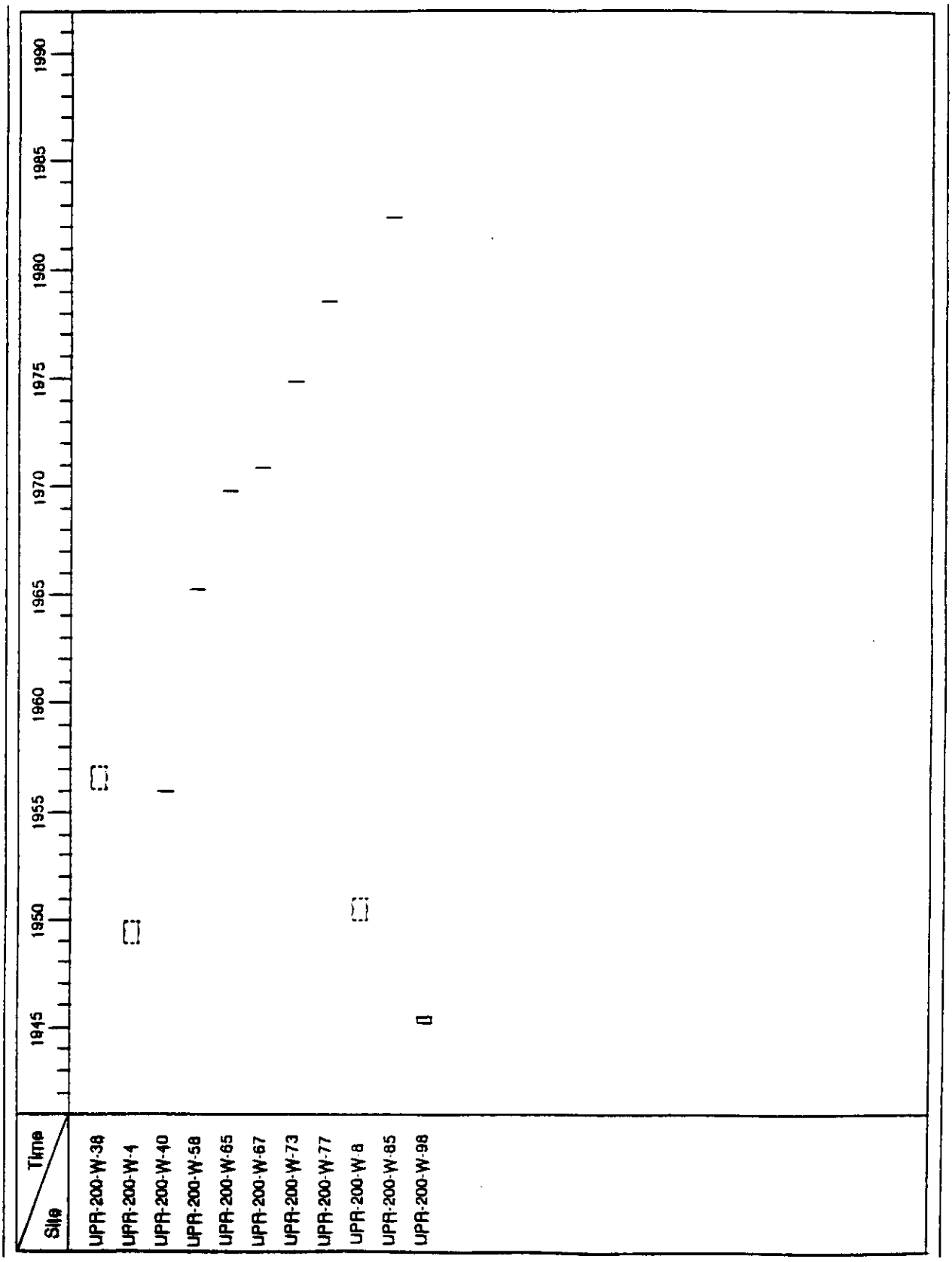


Table 6-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-4 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
216-T-1	Ditch	Active	N44455 W73050 (head),N44570 W73050 (east end),N44955 W73600 (west end)	Low-Level Waste
216-T-10	Trench	Inactive	N43850 W73680 (center)	Nonhazardous/Nonradioactive
216-T-11	Trench	Inactive	N43850 W73680 (center of 216-T-10)	Nonhazardous/Nonradioactive
216-T-2	Reverse Well	Inactive	N43682 W73173 (center)	Mixed Waste
216-T-29	Crib	Inactive	N44130 W72790 (center)	Mixed Waste
216-T-3	Reverse Well	Inactive	N43335 W74250 (center)	TRU-Contaminated Soil Site/Mixed
216-T-33	Crib	Inactive	N44080 W73615 (center)	Mixed Waste
216-T-34	Crib	Inactive	N44680 W74298, N44819 W74165 (centerline)	Mixed Waste
216-T-35	Crib	Inactive	N44558 W74575, N45015 W74520 (centerline)	Mixed Waste
216-T-8	Crib	Inactive	N43510 W72970 (center crib #1), N43540 W72950 (center crib #2)	Mixed Waste
216-T-9	Trench	Inactive	N43850 W73800 (center)	Nonhazardous/Nonradioactive
218-W-8	Burial Ground	Inactive	N43721 W73007, N43696 W72972, N43630 W73019, N43655 W73054	Mixed Waste
241-T-361	Settling Tank	Inactive	N43225 W74000	Mixed Waste
241-TX-154	Diversion Box	Active	N43950 W73130	Mixed Waste
241-TX-302C	Catch Tank	Active	N43900 W73130	Mixed Waste
2607-W3	Septic Tank	Active	N43225 W73650	Nonhazardous/Nonradioactive
2607-W4	Septic Tank	Active	N44350 W72850	Nonhazardous/Nonradioactive
UN-200-W-102	Unplanned Release	Inactive	N43565 W73180, N43430 W73275	Mixed Waste
UN-200-W-137	Unplanned Release	Inactive	N43129 W73540	Mixed Waste
UN-200-W-2	Unplanned Release	Inactive	N43880 W73200	Mixed Waste
UN-200-W-27	Unplanned Release	Inactive	N43985 W73085	Mixed Waste
UN-200-W-3	Unplanned Release	Inactive	N44680 W74298	Mixed Waste
UN-200-W-38	Unplanned Release	Inactive	N44085 W72910	Mixed Waste
UN-200-W-4	Unplanned Release	Inactive	N44680 W74298	Mixed Waste
UN-200-W-58	Unplanned Release	Inactive	N44870 W73940 (beginning) N42450 W77420 (end)	Mixed Waste
UN-200-W-65	Unplanned Release	Inactive	N44860 W73940	Mixed Waste
UN-200-W-67	Unplanned Release	Inactive	N44150 W73350	Mixed Waste
UN-200-W-73	Unplanned Release	Inactive	N44145 W73350	Mixed Waste
UN-200-W-77	Unplanned Release	Inactive	N45000 W71000	Mixed Waste
UN-200-W-8	Unplanned Release	Inactive	N42500 W73350	Mixed Waste
UN-200-W-85	Unplanned Release	Inactive	N44595 W73490	Mixed Waste
UN-200-W-98	Unplanned Release	Inactive	N43550 W73430	Mixed Waste
UPR-200-W-160	Unplanned Release	Inactive	N43880 W73200 (center of site)	Mixed Waste
UPR-200-W-21	Unplanned Release	Inactive	N43650 W73000	Mixed Waste

Table 6-2. Operational Data and Waste Volumes for Operable Unit 200-TP-4 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
216-T-1	Liquid	November 1944	Present		Bot	1825	3	10	2200	178000000	0.00	
216-T-10	Liquid	June 1951	March 1954		Bot	50	10	6	0	0	0.00	
216-T-11	Liquid	June 1951	March 1954		Bot	50	10	6	0	0	0.00	
216-T-2	Liquid	January 1945	May 1950		Top	0	0	75	0	6000000	50.34	
216-T-29	Liquid	March 1949	March 1964		Top	100	48	13	0	74000	1.04	
216-T-3	Liquid	June 1945	August 1946		Top	0	0	0	3	11300000	60.40	
216-T-33	Liquid	January 1963	February 1963		Bot	30	5	11	61	1900000	1.04	
216-T-34	Liquid	May 1966	March 1967		Top	200	30	16	1200	17300000	1.04	
216-T-35	Liquid	March 1967	January 1968		Bot	450	10	15	1400	5720000	1.38	
216-T-8	Liquid	May 1950	September 1951		Bot	28	28	20	220	500000	47.82	
216-T-9	Liquid	February 1951	March 1954		Bot	50	10	6	0	0	0.00	
218-W-8	Solid	1945	1952		Top	0	0	28	54	68	0.65	
241-T-361	Liquid		1976		Top	19	0	0	0	0	0.00	
241-TX-154	Liquid	1949			Top	0	0	0	0	0	0.00	
241-TX-302C	Liquid	1949			Top	0	0	0	0	0	0.00	UPR-200-W-21, -160
2607-W3	Liquid	1944			Top	21	9	0	0	0	0.00	
2607-W4	Liquid	1944			Top	4	2	0	0	0	0.00	
UN-200-W-102	Liquid			February 1972	Top	50	12	12	0	0	1.04	
UN-200-W-137	Liquid			1953-1960	Top	250	250	0	0	0	0.00	
UN-200-W-2	Liquid			1947	Top	0	0	0	0	0	0.00	
UN-200-W-27	Liquid			December 20, 1954	Top	0	0	0	0	0	0.00	
UN-200-W-3	Solid			1949	Top	0	0	0	0	0	0.00	
UN-200-W-38	Liquid			1956	Top	30	15	1	0	0	1.09	
UN-200-W-4	Solid			1949	Top	0	0	0	0	0	0.00	
UN-200-W-58	Solid			April 26, 1965	Top	0	0	0	0	0	0.00	
UN-200-W-65	Liquid			October 27, 1969	Top	0	0	0	0	0	0.63	
UN-200-W-67	Solid			August 5, 1970	Top	24	3	0	0	0	0.86	
UN-200-W-73	Solid			October 16, 1974	Top	1200	20	1	0	0	0.70	
UN-200-W-77	Solid			April 4, 1978	Top	0	0	0	0	0	0.00	
UN-200-W-8	Solid			1950	Top	0	0	0	0	0	1.04	
UN-200-W-85	Liquid			April 22, 1982	Top	0	0	0	0	0	0.00	
UN-200-W-98	Liquid			Spring 1945	Top	0	0	0	0	0	1.14	
UPR-200-W-160	Liquid			December 30, 1955	Top	160	90	15	520	19000	0.65	
UPR-200-W-21	Liquid			July 1953	Top	160	90	0	0	0	0.00	

Table 6-3. Summary of Current Site Conditions for Operable Unit 200-TP-4.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
216-T-1	Light Chain	Surface Contamination	None	None/Unknown	0.0	Native Grass	None	16000	16000
216-T-10	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
216-T-11	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
216-T-2	None	Underground Contamination	Concrete Post w/ Plaque	Sprayed Concrete	0.2	None	None	0	16
216-T-29	Light Chain	Surface Contamination	None	None/Unknown	0.0	None	None	0	0
216-T-3	Light Chain	Surf.+Underground Contam.	Concrete Post w/ Plaque	Gravel/Soil Cover	1.0	Brush/Grass	None	12432	12432
216-T-33	Light Chain	Underground Contamination	None	None/Unknown	0.0	Brush/Grass	None	0	1026
216-T-34	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	3.0	Non-native Grass	None	0	22253
216-T-35	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	4.0	Non-native Grass	None	0	16089
216-T-8	Light Chain	Underground Contamination	Concrete Post w/ Plaque	None/Unknown	0.0	None	None	0	288
216-T-9	None	None	None	None/Unknown	0.0	Native Grass	None	0	0
218-W-8	Light Chain	Surf.+Underground+Cave-in	Concrete Post w/ Plaque	None/Unknown	0.0	None	None	0	0
241-T-361	Light Chain	Surf.+Underground Contam.	None	None/Unknown	-4.0	Brush/Grass	None	0	0
241-TX-154	Light Chain	Surf.+Underground Contam.	None	Sprayed Concrete	0.5	None	None	0	0
241-TX-302C	Light Chain	Underground Contamination	None	Sprayed Concrete	0.3	None	None	0	0
2607-W3	None	Radioactive Material	None	None/Unknown	0.0	Native Grass	None	0	0
2607-W4	Light Chain	Surface Contamination	Metal Post with Plaque	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-W-102	None	None	None	Asphalt Pavment	0.0	None	None	0	0
UN-200-W-2	None		None	Gravel/Soil Cover	0.0	None	None	0	0
UN-200-W-3	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-W-38	Light Chain	Surf.+Underground Contam.	None	Sprayed Concrete	0.0	None	None	0	0
UN-200-W-4	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-W-58	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-W-65	None	Surface Contamination	None	None/Unknown	0.0	Native Grass	None	0	0
UN-200-W-67	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	Brush/Grass	Inside Fenced Area	0	0
UN-200-W-73	None	None	None	None/Unknown	0.0	Native Grass	None	0	0
UN-200-W-77	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-W-8	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-W-85	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	Brush/Grass	Inside Fenced Area	0	0
UN-200-W-98	Light Chain	Surf.+Underground Contam.	None	Soil cover/Backfill	0.0	T	Abuts Adjac. Site	0	0

The inorganic compounds thought to be present are nitric acid, sodium dichromate, and sulfuric acid (Table 6-4) (DOE-RL 1987).

The well has been sprayed with concrete (site visit by authors, September 1991) (Hanford photograph A-19).

6.3 216-T-3 REVERSE WELL

The 216-T-3 reverse well is an inactive waste site located 150 ft north of 23rd Street between 241-T-361 and 216-T-6 sites (Maxfield 1979; Stenner et al. 1988). The well received 11,300,000 L of cell drainage from tank 5-6 in the 221-T canyon building. It also received 224-T building waste as overflow from the 241-T-361 settling tank. The waste is low salt and neutral/basic (Stenner et al. 1988).

The pipeline was blanked when the effluent flow rate exceeded the infiltration rate. In August 1975, the aboveground piping was removed, all sinkholes filled, and the ground surface decontaminated and leveled (Maxfield 1979).

The inorganics thought to be present are: ammonium nitrate, fluoride, nitrate, phosphate, potassium, sodium, sodium oxalate, and sulfate (DOE-RL 1987). The radioisotopes present are: cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

This well is enclosed in the same compound as the 241-T-361 settling tank. The light chain barricade has surface and underground contamination signs. The well consists of a 2-ft-high, stubbed steel pipe with a gauge at the tap (Hanford photograph A-20). Two monitoring wells are located in the compound near the well (site visit by authors, September 1991).

6.4 216-T-8 CRIB

The 216-T-8 crib is an inactive double-crib waste site located 50 ft south of the 222-T building. The site received 500,000 L of decontamination sink waste and sample slurper waste from the 222-T building. The waste is neutral/basic (Stenner et al. 1988). When laboratory operations in the 222-T building were shut down, the pipeline to the building was blanked (Lundgren 1970).

The inorganic compounds thought to be present are nitric acid, sodium dichromate, and sulfuric acid (DOE-RL 1987). The radionuclides present are: cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

The two cribs are surrounded by a light chain barricade (Hanford photograph A-21). They have cave-in potential signs and an 8-ft-high galvanized steel vent pipe (site visit by authors, September 1991).

Table 6-4. Summary of Inorganic and Organic Contaminants in Operable Unit 200-TP-4 (BHI 1994).

Site	Fluoride (kg)	H2SO4 (kg)	HNO3 (kg)	Potassium (kg)	Sodium (kg)	NaCr2 (kg)	Na OH (kg)	Na Oxalate (kg)	NaSi (kg)	NH4NO3 (kg)	Nitrate (kg)	Phosphate (kg)	Sulfamic Acid (kg)
216-T-1	0	0	0	0	0	0	10000	0	0	0	0	0	0
216-T-2	0	10000	6000	0	0	200	0	0	0	0	0	0	0
216-T-29	0	0	8000	0	0	0	0	0	0	0	0	0	0
216-T-3	40000	0	0	60000	250000	0	0	9000	0	4000	290000	21000	2400
216-T-33	0	0	0	0	0	0	10	0	0	0	0	0	0
216-T-34	0	0	0	0	0	0	0	0	0	0	1000	0	0
216-T-35	0	0	0	0	0	0	0	0	0	0	1000	0	0
216-T-8	0	1000	1000	0	0	10	0	0	0	0	0	0	0

6.5 216-T-9 THROUGH 216-T-11 TRENCHES

These trenches are inactive waste sites located about 610 ft west of the 221-T canyon building (Maxfield 1979). All of these sites received heavy equipment and vehicle decontamination waste. In 1954, the trenches were backfilled and decontamination operations were transferred to 216-T-13. The sites were exhumed in May 1972, and released from radiation zone status. No radioactivity or evidence of chemical buildup was found in the sites (Stenner et al. 1988).

No sign can be found of these trenches (site visit by authors, September 1991) (Hanford photograph A-22). The warning signs were probably removed when the soil was exhumed (Shannon, personnel communication).

6.6 216-T-29 CRIB

The 216-T-29 crib is an inactive waste site located approximately 190 ft east of the 221-T canyon building and 95 ft west of Beloit Avenue (Maxfield 1979). The unit received a total of 74,000 L of condensate runoff from the 291-T sand filter. This waste is potentially acidic (Stenner et al. 1988), as the only inorganic thought to be present is nitric acid (DOE-RL 1987).

The site was deactivated when the sand filter bypass water seal was removed, allowing the 221-T canyon building exhaust air to flow directly to the 291-T-1 stack (Lundgren 1970).

The 291-T sand filter inlet trenches drain to a french drain pipe extending into the ground at the north corner of the sand filter (Hanford photograph A-23). Any moisture condensed from the canyon air on the filter bed will escape to the ground at this location. The amount and the radioactivity are both thought to be very low (Maxfield 1979).

The sand filter is cordoned off and marked "surface contamination." The seams on top of the filter have been coated with plastic and sealed (site visit by authors, September 1991).

6.7 216-T-33 CRIB

The 216-T-33 crib is an inactive waste site located about 250 ft west of the 2706-T building and 900 ft north of 23rd Street (Hanford photograph A-24). This unit received 1,900,000 L of low-salt decontamination waste from the 2706-T building. The waste is mainly sodium hydroxide and is thought to be neutral/basic (DOE-RL 1987). The radioisotopes present are: cesium-137, strontium-90, and ruthenium-106 (Brown et al. 1990).

The site was used the first 2 months of 1963 before the perforations in the tile line at the discharge point to the unit became plugged. The amount of liquid that actually reached the unit has been questioned by plant operation management, who believed the line to the unit retained all of the waste. No surface contamination has been found at this crib site (Maxfield 1979). Sections of the tile line were removed and the building effluent was rerouted to the 216-T-28 crib via the 112-T tank in the 241-T tank farm (Lundgren 1970). The site surface was stabilized in July 1991 (Environmental Protection files).

Wells W-11 through W-14 monitor this unit. Data indicate that breakthrough to groundwater has not occurred at this site (Fecht et al. 1977).

6.8 216-T-34 CRIB

The 216-T-34 crib is an inactive waste site located about 1,500 ft north of 23rd Street and 1,500 ft west of Beloit Avenue (Stenner et al. 1988; Harmon 1975). The site received 17,300,000 L of 300 Area laboratory waste from the 340 facility. The waste is thought to be neutral/basic and to contain the following radioisotopes: cesium-137, ruthenium-106, and strontium-90 (Stenner et al. 1988; Brown et al. 1980). The pipelines northwest of the unit were capped (Lundgren 1970) when the unit reached its prescribed radionuclide disposal guide limit (Stenner et al. 1988). The discharge lines were rerouted to the 216-T-35 crib (Lundgren 1970).

The tanker unloading station and associated underground piping still remains at the northwest corner of this unit (Hanford photograph A-25). During the construction and tie-in of the 216-T-35 companion crib in February 1976, low-level beta/gamma soil contamination to 30,000 c/m was found around the 216-T-34 unloading station piping (Maxfield 1979). Contaminated soil (40 yd^3) was removed and buried in the 200 West Area dry burial ground. Residue contamination still remains near the ground surface at the unloading station (Maxfield 1979). The site surface was stabilized in July 1990 (Huckfeldt 1990).

6.9 216-T-35 CRIB

The 216-T-35 crib is an inactive waste site located 1,520 ft northwest of the 221-T canyon building and 1,368 ft north of 23rd Street (Harmon 1975). This unit received 5,720,000 L of 300 Area laboratory waste from the 340 building (Stenner et al. 1988) thought to contain: cesium-137, ruthenium-106, and strontium-90 (Brown et al. 1990).

A small area at the unloading station has low-level underground contamination (see 216-T-34 crib, Section 6.8). There has never been any radioactive surface contamination at this site (Fecht et al. 1977).

Well W-11 and wells W-17 through W-21 monitor this unit. Data indicate that breakthrough to groundwater has not occurred at this site (Fetch et al. 1977). The surface of this site was stabilized in July 1990 (Huckfeldt 1990) (Hanford photograph A-26).

6.10 218-W-8 BURIAL GROUND

The 218-W-8 burial ground is an inactive waste site located 30 yd southeast of the 222-T building (Hanford photograph A-27). This unit, which consists of three underground vaults, received 68 m^3 of laboratory process sample waste from the 222-T building (Stenner et al. 1988). The waste is thought to contain: cesium-137, ruthenium-106, and strontium-90 (Anderson et al. 1991).

The disposal chute and three vaults are enclosed within a surface radiation contamination barrier. Within this barrier, there is an additional barrier that surrounds the original vault (site visit by authors, September 1991).

6.11 241-TX-154 DIVERSION BOX

The 241-TX-154 diversion box is an active waste site located immediately east of the 221-T canyon building. The unit controls radioactive waste solutions from processing and decontamination operations, and is associated with the 241-TX-302C catch tank and the 214-TX tank farm. Quantities are variable according to specific plant operation. Diversion boxes drain to catch tanks or SSTs. They are designed to contain leaks from transfers and drainage from within the unit (DOE-RL 1987).

The area from the diversion box approximately to the south end of the 224-T building was stabilized with concrete in May 1991 (Welsch, personnel communication). The top of the box, however, has not been sealed or sprayed with concrete (site visit by authors, September 1991).

6.12 241-TX-302C CATCH TANK

The 241-TX-302C catch tank is an active waste site located immediately east of the 221-T canyon building. This unit is associated with the 241-TX-154 diversion box and the 241-TX tank farm. Volumes are variable according to specific plant operations (DOE-RL 1987). The tank currently holds 2,550 gal of liquid waste (BHI 1994). UPR-200-W-21 and UPR-200-W-160 are associated with this site.

The UPR-200-W-21 site consists of a cave in that occurred in July 1953, over a process line near the 241-TX-154 diversion box causing an extended area between the 221-T canyon building and 222-T building to become contaminated. Dose rates of 25 R/h were reported at a distance of 8 in. A jumper leak in the 241-TX-154 diversion box caused the 214-TX-302C catch tank to overflow (Maxfield 1979). The area was covered with blacktop and posted with underground contamination warning signs (Stenner et al. 1988).

UPR-200-W-160 occurred on December 30, 1955, when several thousand gallons of metal waste and rainwater were released because of a failure of an underground transfer line from the 241-TX-302C catch tank to the 241-U-101 metal waste storage tank (Maxfield 1979). The liquid was forced through several feet of soil onto the surface surrounding the 241-TX-302 catch tank, between the 221-T canyon building and the 222-T building, and includes the area west of and in between the double fences of the 224-T building (BHI 1994). The area was backfilled and sprayed with tar and posted as a radiation zone (Baldridge 1959). In the late spring of 1968, a 10-ft cut was placed in the eastern side of the zone. The cut was covered with cement blocks to provide an adequate measure of shielding (Maxfield 1979). This release has a duplicate, UPR-200-W-40, that is scheduled for deletion.

The tank and surrounding area have been sprayed with concrete. The tank has a fluid-level recorder projecting from the top (site visit by authors, September 1991).

6.13 241-T-361 SETTLING TANK

The 241-T-361 settling tank site is located about 700 ft southwest of the 221-T canyon building. The unit received radioactive contaminated liquid from T Plant (Hanlon 1990) and is now estimated to contain 28,000 gal of sludge with approximately 2 g of plutonium (15,500 Ci beta/gamma) (DOE-RL 1987). This unit was isolated in 1985 (Harlon 1990).

6.14 2607-W3 SEPTIC TANK

The 2607-W3 septic tank is an active waste site located southwest of the 221-T canyon building. The unit accepted sanitary wastewater and sewage and includes a drain field. The estimated rate of waste generation is 14.2 m^3/d (DOE-RL 1987).

The easternmost access port has a radioactive material warning sign posted (site visit by authors, September 1991).

6.15 2607-W4 SEPTIC TANK

The 2607-W4 septic tank is an active waste site located northwest of the 221-TR canyon building. The unit accepted wastewater and sewage and includes a drain field. The estimated rate of waste generation is 10.6 m^3/d (DOE-RL 1987).

The drainfield is 10 ft by 30 ft by 3 ft, and the bottom is covered with tumbleweeds (site visit by authors, September 1991).

6.16 UN-200-W-2 UNPLANNED RELEASE

The UN-200-W-2 UPR occurred in 1947, just north of the 224-T building. A waste line failed and discharged to the ground. The contamination was measured to a depth of 10 to 11 ft below the surface. A spare waste line was placed in service (Stenner et al. 1988).

The northwest side of T Plant is paved with asphalt or gravel. There are no markers or signs of the release (site visit by authors, September 1991).

6.17 UN-200-W-3 UNPLANNED RELEASE

The UN-200-W-3 UPR occurred at the T Plant railroad cut, northwest of the 221-T canyon building. Radioactively contaminated cask cars and equipment being taken to the 200 West Area burial ground from T Plant was spread to the ground on several occasions during 1949. The waste amount and types were not recorded. The contamination was covered with about 10 in. of clean gravel in the spring of 1950 (Stenner et al. 1988).

From about 40 ft east of the start of the railway cut to the 221-T canyon building, the railroad is enclosed within a surface radiation contamination barricade. Extending west of the barricade, 1 ft of gravel has been placed onto the railroad. There is a 6 ft by 6 ft light chain barricade with surface contamination placards and is located on the north side of the tracks near this gravel patch. These areas probably resulted from one of the several UPRs that occurred along this track, but it is not known which one (Nelson, personal communication).

The coordinates in BHI (1994) show the release to have occurred northwest of the barricade; except for the unloading facilities marked with surface contamination (site visit by authors, October 1991).

6.18 UN-200-W-4 UNPLANNED RELEASE

The UN-200-W-4 UPR occurred in 1949 at a location northwest of the 221-T canyon building. Contamination was spread from T Plant to the heavy equipment burial ground during transit of a burial box. The site has readings averaging 7 mR/h of unknown beta/gamma (Stenner et al. 1988).

Coordinates show this release occurred near UN-200-W-3, although no markers or signs of stabilization were apparent (site visit by authors, October 1991).

6.19 UN-200-W-8 UNPLANNED RELEASE

The UN-200-W-8 UPR is located in the 200-SS-2 operable unit and is discussed later in this section.

6.20 UN-200-W-27 UNPLANNED RELEASE

The UN-200-W-27 UPR occurred on December 20, 1954, at an undefined area within T Plant. The spill was the result of failure of a first-cycle process waste line, that resulted in a cave in and solution runoff (McCullugh and Cartmell 1968; Stenner et al. 1988).

6.21 UN-200-W-38 UNPLANNED RELEASE

The UN-200-W-38 UPR occurred in 1956 near the 241-TX-154 diversion box. The rupture of an underground process line caused a 15-ft by 30-ft pool of metal waste on the ground surface (McCullugh and Cartmell 1968) and a radiation field of 1.2 R/h at 80 ft (Stenner et al. 1988).

The area around this box has been stabilized with sprayed concrete. The site has been released, therefore, it is not marked (site visit by authors, October 1991).

6.22 UN-200-W-58 UNPLANNED RELEASE

The UN-200-W-58 UPR occurred on April 26, 1965, from the 221-T railroad cut to the 200 West Area burial ground. Beta/gamma contamination spread during the process of transporting cell blocks from the 221-T canyon building to the burial grounds (Stenner et al. 1988).

No markers or signs of stabilization can be located along the railway northwest of the surface contamination barricade (site visit by authors, October 1991).

6.23 UN-200-W-65 UNPLANNED RELEASE

The UN-200-W-65 UPR occurred on October 27, 1969. It is assumed that contamination from a rail car that was not effectively contained was the contamination source. Unknown beta/gamma with readings from 5,000 c/m to 150 mR/h were found between the rails of the spur line adjacent to the spur line (Stenner et al. 1988).

The spur line is not labeled, stabilized, or barricaded (site visit by authors, October 1991).

6.24 UN-200-W-67 UNPLANNED RELEASE

The UN-200-W-67 UPR occurred on August 5, 1970. Contamination of 20,000 c/m was found in an area 3 ft by 24 ft on the north side of the 2706-T building following the removal of a lift that was reading 500 mR/h (Stenner et al. 1988).

A fence surrounds this building on the south, west, and north sides. The fence extends about 100 ft from the building. The northside of the building is paved with gravel and is used for equipment storage. There is no indication of a radiation hazard (site visit by authors, October 1991).

6.25 UN-200-W-73 UNPLANNED RELEASE

The UN-200-W-73 UPR occurred on October 6, 1974. Contamination of up to 40 mR/h from an unknown beta/gamma source spread from a hole in a multi-purpose box while it was being transported from the 221-T canyon building tunnel to the 2706-T building on the railroad right-of-way (Stenner et al. 1988).

This stretch of railway is neither stabilized nor barricaded (site visit by authors, October 1991).

6.26 UN-200-W-77 UNPLANNED RELEASE

The UN-200-W-77 UPR occurred on April 4, 1978. While collecting soil samples for the environmental surveillance program, some highly radioactive coyote feces were found in the northwest portion of the 200 West Area. Field instruments showed plutonium-239 and americium-241 with 40,000 c/m beta/gamma activity and 55,000 c/m alpha activity on the feces. All contaminated feces were collected and sent to the laboratory for evaluation and radioisotopic analysis (Stenner et al. 1988).

This site is not marked or barricaded. Sage and other brush appear well established (site visit by authors, September 1991).

6.27 UN-200-W-85 UNPLANNED RELEASE

The UN-200-W-85 UPR occurred on April 22, 1982. While a multi-purpose transfer box was parked on a pad behind the 2706-T building, liquid was observed dripping from the box. The contamination was found to be an unknown beta/gamma emitter with readings of 100,000 c/m. The area was decontaminated to background radiation levels (DOE-RL 1987).

The concrete pads around the 2706-T building are not labeled or barricaded. There is no indication of a radiation hazard or stabilization (site visit by authors, September 1991).

6.28 UN-200-W-98 UNPLANNED RELEASE

The UN-200-W-98 UPR occurred in the spring of 1945. A leak in the underground metal waste transfer line surfaced at section R-19, 221-T canyon building. An unknown amount of mixed fission products contaminated a small surface area. The affected area was later overfilled with about 4 ft of clean soil. A maximum dose of 20 R/h was found over the area. A blacktop road has since been constructed over the top of this site and is used daily (Maxfield 1979).

In the spring of 1977, a number of test holes were cut to a depth of 4 ft across the site, with no radioactivity being detected (Maxfield 1979).

The areas around each of the exits on the east side of T Plant is barricaded and marked "surface contamination." The area around R-19, at the southeast corner of 221-T canyon building, also has underground radiation signs. There are no other signs of any release (site visit by authors, September 1991).

6.29 UN-200-W-102 UNPLANNED RELEASE

The UN-200-W-102 UPR occurred when the 224-T building was being renovated, alpha contamination was found in the soil on the back side of the building. This contamination is thought to have come from moisture that seeped through pipe joints from underground process tank vent lines during the years of process operation. Excavation of the area showed soil contamination below the surface of an area of 50 ft long by 12 ft wide by 12 ft deep. A total of 139 drums of soil, containing approximately 10 g of plutonium, were removed from the zone (Maxfield 1979).

The northwest side of the 224-T building is paved with asphalt. The southeast side has an extensive gravel lot. There are no barricades or other signs of the release (site visit by authors, September 1991).

6.30 UN-200-W-137 UNPLANNED RELEASE

The UN-200-W-137 UPR is a duplicate of 218-W-7 and is part of S Plant Operable Unit 200-RO-3, which occurred under the 222-S building (BHI 1994).

7.0 OPERABLE UNIT 200-TP-5

Operable Unit 200-TP-5 is situated between Operable Units 200-TP-1 and 200-TP-2 (Figure 3-1). It consists of the 241-TX and 241-TY tank farms. The 241-TX tank farm began operating in 1949, while the 241-TY tank farm operations began a few years later (about 1953) (Figure 7-1). Both tank farms continued operations through the mid 1970's to early 1980's. The relationship of the 241-TX and 241-TY tank farms to other tank farms onsite is depicted in Figure 7-2. The entire tank farm system is designed to allow movement of waste from one tank farm to another.

Tables 7-1 and 7-2 provide a summary of individual tank locations, type of waste, operational dates, and associated UPRs. The information contained in these tables was extracted from BHI (1994). The authors have conducted several site visits to the tank farms and Table 7-3 summarizes some of their findings regarding current site conditions. The lack of a defined surface contamination or radiation zone in the table does not signify that these areas do not exist; it only means that the Health Physics department does not designate such zones for individual facilities within each tank farm.

7.1 241-TX TANK FARM

The 241-TX tank farm consists of a series of buried SSTs that contain mixed waste. It is located approximately 2,500 ft southwest of the 221-T canyon building, directly south of the 241-TY tank farm. The surface elevation of the tank farm is between 668 and 670 ft above mean sea level (amsl), and the depth to groundwater below the tank farm is approximately 198 ft (BHI 1994).

The 241-TX tank farm contains 18 tanks, numbered 241-TX-101 through 241-TX-118. Currently, all the tanks are inactive and each has undergone initial stabilization and has a status of interim isolation (BHI 1994). Since all the tanks are of similar construction and are located adjacent to one another, their history will be discussed as a single topic.

Currently, the entire tank farm, including the 241-TX-153, 241-TXR-152, and 241-TXR-153 diversion boxes, and the 241-TX-302A catch tank are surrounded by a chain-link fence, topped with three strands of barbed wire. The tank farm is covered with gravel, generally at the level of the surrounding grade. The 241-TXR-153 and 241-TXR-152 diversion boxes appear to be atop a 12-ft rise. The tanks are marked by yellow stand pipes and foam-covered pads (site visit by authors, September 1991).

Tanks are composed of a 24-ft-high carbon-steel liner with a reinforced concrete shell that has an inside height of 37 ft. All tanks in the 241-TX tank farm are of second generation design (BHI 1994). Each tank bottom is 45 ft below grade and the tanks are covered with about 8 ft of overburden. Each tank is 75 ft in diameter and their bottoms are disk shaped. Tank operating depth is 23 ft, leaving 1 ft of freeboard (BHI 1994).

The tank farm was constructed to receive nonboiling waste and each tank has a capacity of 758,000 gal.

Figure 7-1. Summary of the Operational Periods for Operable Unit 200-TP-5.
(sheet 1 of 2)

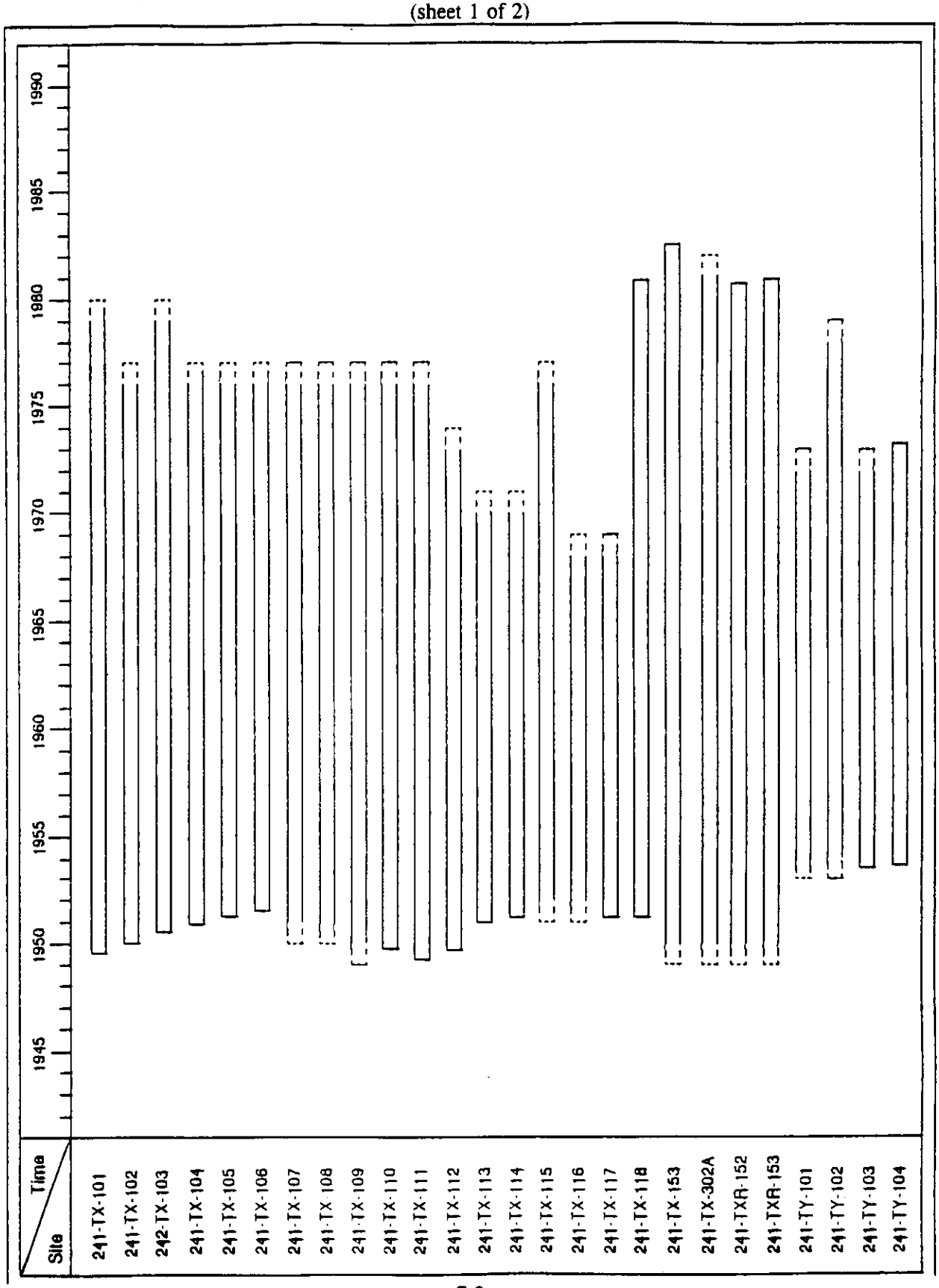


Figure 7-1. Summary of the Operational Periods for Operable Unit 200-TP-5.
(sheet 2 of 2)

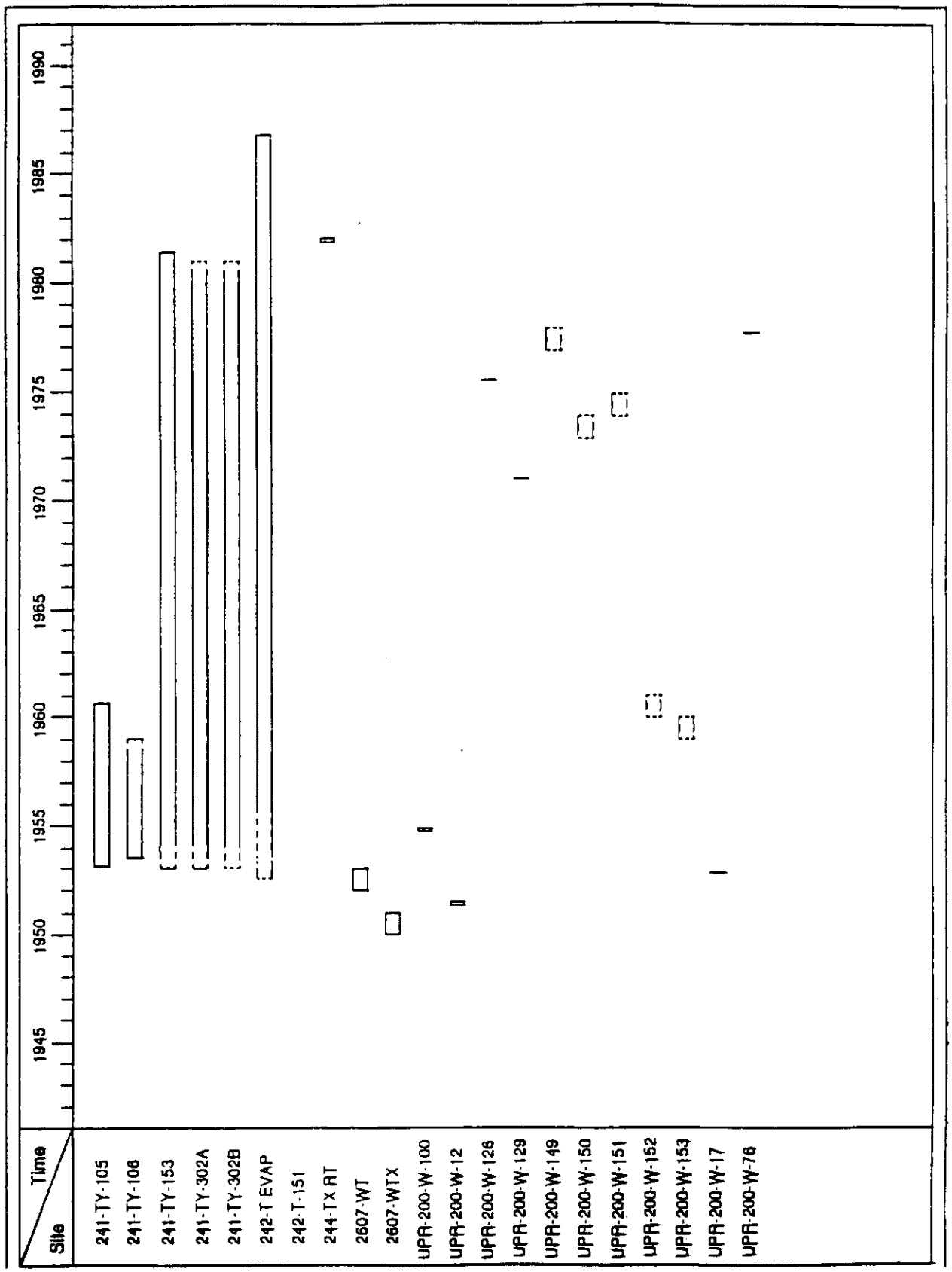


Figure 7-2. Schematic Diagram of the 200 Areas Tank Farm Distribution System.

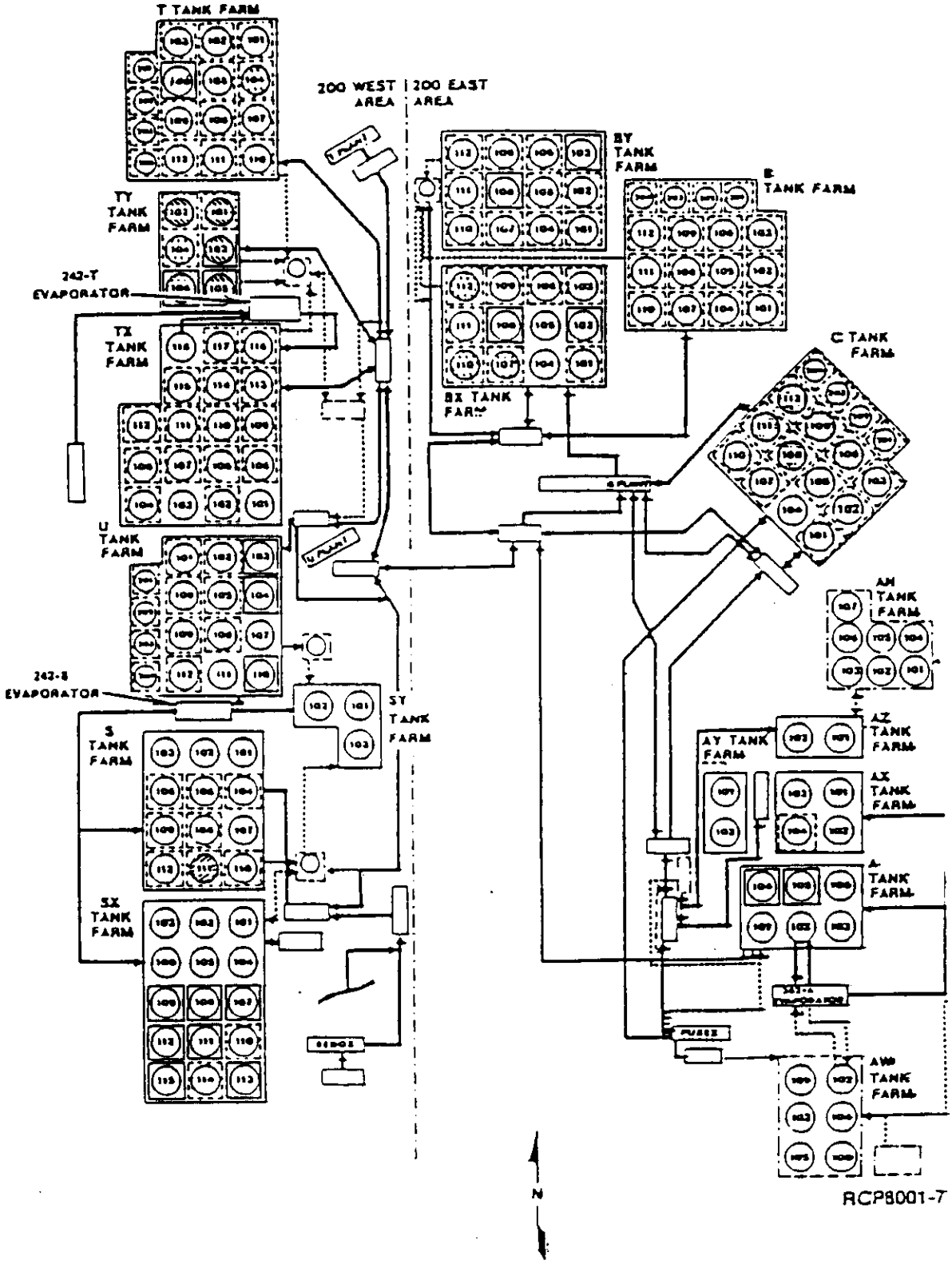


Table 7-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-5 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
241-TX-101	Single-Shell Tank	Inactive	N41650 W75750	Mixed Waste
241-TX-102	Single-Shell Tank	Inactive	N41650 W75852	Mixed Waste
241-TX-103	Single-Shell Tank	Inactive	N41650 W75954	Mixed Waste
241-TX-104	Single-Shell Tank	Inactive	N41650 W76056	Mixed Waste
241-TX-105	Single-Shell Tank	Inactive	N41752 W75750	Mixed Waste
241-TX-106	Single-Shell Tank	Inactive	N41752 W75852	Mixed Waste
241-TX-107	Single-Shell Tank	Inactive	N41752 W75954	Mixed Waste
241-TX-108	Single-Shell Tank	Inactive	N41752 W76056	Mixed Waste
241-TX-109	Single-Shell Tank	Inactive	N41854 W75750	Mixed Waste
241-TX-110	Single-Shell Tank	Inactive	N41854 W75852	Mixed Waste
241-TX-111	Single-Shell Tank	Inactive	N41854 W75954	Mixed Waste
241-TX-112	Single-Shell Tank	Inactive	N41854 W76056	Mixed Waste
241-TX-113	Single-Shell Tank	Inactive	N41956 W75750	Mixed Waste
241-TX-114	Single-Shell Tank	Inactive	N41956 W75852	Mixed Waste
241-TX-115	Single-Shell Tank	Inactive	N41956 W75954	Mixed Waste
241-TX-116	Single-Shell Tank	Inactive	N42058 W75750	Mixed Waste
241-TX-117	Single-Shell Tank	Inactive	N42058 W75852	Mixed Waste
241-TX-118	Single-Shell Tank	Inactive	N42058 W75954	Mixed Waste
241-TX-153	Diversion Box	Inactive	N41600 W75640 (southeast corner)	Mixed Waste
241-TX-302A	Catch Tank	Inactive	N41600 W75650	Mixed Waste
241-TXR-152	Diversion Box	Inactive	N41700 W75660	Mixed Waste
241-TXR-153	Diversion Box	Inactive	N41700 W75660	Mixed Waste
241-TY-101	Single-Shell Tank	Inactive	N42604 W75852	Mixed Waste
241-TY-102	Single-Shell Tank	Inactive	N42604 W75954	Mixed Waste
241-TY-103	Single-Shell Tank	Inactive	N42502 W75852	Mixed Waste
241-TY-104	Single-Shell Tank	Inactive	N42502 W75954	Mixed Waste
241-TY-105	Single-Shell Tank	Inactive	N42400 W75852	Mixed Waste
241-TY-106	Single-Shell Tank	Inactive	N42400 W75954	Mixed Waste
241-TY-153	Diversion Box	Inactive	N42275 W75665	Mixed Waste
241-TY-302A	Catch Tank	Inactive	N42338 W75673	Mixed Waste
241-TY-302B	Catch Tank	Inactive	N42610 W75684	Mixed Waste
242-T-151	Diversion Box	Inactive	N42040 W75700	Mixed Waste
2607-WT	Septic Tank	Active	N42275 W75650	Nonhazardous/Nonradioactive
2607-WTX	Septic Tank	Active	N41550 W76075	Nonhazardous/Nonradioactive
UN-200-W-100	Unplanned Release	Inactive	N41750 W75950	Mixed Waste
UN-200-W-17	Unplanned Release	Inactive	N42100 W75750	Mixed Waste
UN-200-W-76	Unplanned Release	Inactive	N42035 W76065	Mixed Waste
UPR-200-W-126	Unplanned Release	Inactive	N41645 W75575	Mixed Waste
UPR-200-W-129	Unplanned Release	Inactive	N41948 W75750	Mixed Waste
UPR-200-W-149	Unplanned Release	Inactive	N41752 W75954	Mixed Waste
UPR-200-W-150	Unplanned Release	Inactive	N42502 W75852	Mixed Waste
UPR-200-W-151	Unplanned Release	Inactive	N42502 W75954	Mixed Waste
UPR-200-W-152	Unplanned Release	Inactive	N42400 W75852	Mixed Waste
UPR-200-W-153	Unplanned Release	Inactive	N42400 W75954	Mixed Waste

Table 7-2. Operational Data and Waste Volumes for Operable Unit 200-TP-5 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PHL Hazard Ranking	Associated UPR(s)
241-TX-101	Liquid	July 27, 1949	1980		Top	0	0	0	0	0	0.00	
241-TX-102	Liquid	January 21, 1950	1977		Top	0	0	0	0	0	0.00	
241-TX-103	Liquid	July 14, 1950	1980		Top	0	0	0	0	0	0.00	
241-TX-104	Liquid	November 12, 1950	1977		Top	0	0	0	0	0	0.00	
241-TX-105	Liquid	March 2, 1951	1977		Top	0	0	0	0	0	0.00	
241-TX-106	Liquid	June 16, 1951	1977		Top	0	0	0	0	0	0.00	
241-TX-107	Liquid	1950	1977		Top	0	0	0	0	0	0.00	UPR-200-W-149
241-TX-108	Liquid	1950	1977		Top	0	0	0	0	0	0.00	
241-TX-109	Liquid	1949 ?1950 [22?]?	1977		Top	0	0	0	0	0	0.00	
241-TX-110	Liquid	September 1949	1977		Top	0	0	0	0	0	0.00	
241-TX-111	Liquid	March 1950	1977		Top	0	0	0	0	0	0.00	
241-TX-112	Liquid	August 24, 1950	1974		Top	0	0	0	0	0	0.00	
241-TX-113	Liquid	December 1950	1971		Top	0	0	0	0	0	0.00	UPR-200-W-129
241-TX-114	Liquid	April 1951	1971		Top	0	0	0	0	0	0.00	
241-TX-115	Liquid	1951	1977		Top	0	0	0	0	0	0.00	
241-TX-116	Liquid	1951	1969		Top	0	0	0	0	0	0.00	
241-TX-117	Liquid	April 1951	1969		Top	0	0	0	0	0	0.00	
241-TX-118	Liquid	April 1951	November 17, 1980		Top	0	0	0	0	0	0.00	
241-TX-153	Liquid	1949	July 1982		Top	56	24	17	0	0	0.00	UPR-200-W-126
241-TX-302A	Liquid	1949	1982		Top	0	0	0	0	0	0.00	
241-TXR-152	Liquid	1949	August 1980		Top	0	0	0	0	0	0.00	
241-TXR-153	Liquid	1949	December 1980		Top	0	0	0	0	0	0.00	
241-TY-101	Liquid	1953	1973		Top	0	0	0	0	0	0.00	
241-TY-102	Liquid	1953	1979		Top	0	0	0	0	0	0.00	
241-TY-103	Liquid	July 16, 1953	1973		Top	0	0	0	0	0	0.00	UPR-200-W-150
241-TY-104	Liquid	August 10, 1953	March 1974		Top	0	0	0	0	0	0.00	UPR-200-W-151
241-TY-105	Liquid	January 29, 1953	September 1960		Top	0	0	0	0	0	0.00	UPR-200-W-152
241-TY-106	Liquid	June 27, 1953	1959		Top	0	0	0	0	0	0.00	UPR-200-W-153
241-TY-153	Liquid	1953	May 1981		Top	44	10	17	0	0	0.00	
241-TY-302A	Liquid	1953	1981		Top	0	0	0	0	0	0.00	
241-TY-302B	Liquid	1953	1981		Top	0	0	0	0	0	0.00	
242-T-151	Liquid				Top	0	0	0	0	0	0.00	
2607-WT	Liquid	1952			Top	0	0	0	0	0	0.00	
2607-WTX	Liquid	1950			Top	0	0	0	0	0	0.00	
UN-200-W-100	Liquid			November 1954	Top	125	100	0	0	0	1.25	
UN-200-W-17	Liquid			September 11, 1952	Top	0	0	0	0	0	1.18	
UN-200-W-76	Solid			August 24, 1977	Top	300	150	0	0	0	0.58	
UPR-200-W-126	Liquid			May 8, 1975	Top	0	0	0	0	0	0.00	
UPR-200-W-129	Liquid			January 7, 1971	Top	0	0	0	0	0	0.00	
UPR-200-W-149	Liquid			1977	Top	0	0	0	0	0	0.00	
UPR-200-W-150	Liquid			1973	Top	0	0	0	0	0	0.00	
UPR-200-W-151	Liquid			1974	Top	0	0	0	0	0	0.00	
UPR-200-W-152	Liquid			1960	Top	0	0	0	0	0	0.00	
UPR-200-W-153	Liquid			1959	Top	0	0	0	0	0	0.00	

Table 7-3. Summary of Current Site Conditions for Operable Unit 200-TP-5.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
241-TX-101	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-102	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-103	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-104	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-105	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-106	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-107	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-108	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-109	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-110	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-111	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-113	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-114	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-115	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-116	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-117	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-118	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-TX-153	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-TX-302A	None	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TXR-152	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	12.0	Native Grass	Inside Fenced Area	0	0
241-TXR-153	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	12.0	Native Grass	Inside Fenced Area	0	0
241-TY-101	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-102	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-103	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-104	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-105	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-106	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-153	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	0.0	None	Inside Fenced Area	0	0
241-TY-302A	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
241-TY-302B	None	Could not determine	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
242-T EVAP	Chain-Link Fence	Could not determine	Could not determine	Sprayed Plastic Foam	0.0	None	Inside Fenced Area	0	0
242-T-151	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
2607-WT	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
2607-WTX	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	Non-native Grass	Inside Fenced Area	0	0
UN-200-W-100	Chain-Link Fence	Surface Contamination	None	Gravel	0.0	None	Inside Fenced Area	0	0
UN-200-W-17	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0
UN-200-W-76	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.0	None	Inside Fenced Area	0	0

The tanks are arranged in groups of three that cascade from one to the other, such that the bulk of the solid waste is contained in the first tank of a cascading series. Cooling of the waste material and precipitation, as well as gravity settling of particulate material, occur in each tank, thus the bulk of the radionuclides collect in tank bottoms. Noncondensible gases associated with the waste were vented directly to the atmosphere (Stenner et al. 1988).

The waste stream received by the tank farm was generated largely from the bismuth phosphate process used in the 221-T canyon building and the reduction oxidation (REDOX) facility. The waste stream contained uranium compounds and up to 90% of the original fission products, coating wastes from fuel rod processing operations, decontamination waste containing up to 10% of the original fission activity and as much as 1% plutonium, and second decontamination cycle waste that generally contained less than 0.1% of the original fission activity, and as much as 1% plutonium. Other waste streams received by the 241-TX tank farm include waste from the solidification program and the uranium recovery program (BHI 1994). The fluid transferred to the tanks during their operation did not contain complexed waste (BHI 1994).

The waste contained in the tanks can occur in three forms: sludge, saltcake, and/or liquid. Sludge is comprised primarily of insoluble metal hydroxides and hydrated oxides that precipitated from neutralized high-level waste solutions. Saltcake is comprised primarily of crystallized nitrate salts (particularly sodium nitrate), the majority being produced by waste concentration operations. The liquid wastes are aqueous solutions rich in sodium hydroxide and sodium aluminate, as well as sodium nitrate. Liquid waste can be present as a supernate or as an interstitial fluid (McKenney and Blevins 1983).

The total quantity of waste estimated by the PNL Hazard Ranking System to have entered the groundwater at the 241-TX tank farm is approximately 34,000 tons (Stenner et al. 1988). Table 7-4 provides a breakdown of the quantities and specific waste currently stored in each tank. The table clearly shows that the majority of waste stored in the tank farm is saltcake and only a minor amount of supernatant liquid and some interstitial liquid is available for infiltration through the vadose zone. Figure 7-3 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the 241-TX tank farm. Note, with the exception of the 241-TX-112 tank, tanks with more than 600,000 gal of stored waste are assumed to be leaking. The 241-TX-107 tank is the only tank assumed to be leaking that contains less than 100,000 gal of waste (BHI 1994).

Several dry wells within the 241-TX tank farm are used to monitor the soil for radioactivity, and serve as one form of leak detection. In addition, a series of groundwater monitoring wells surround both the 241-TX and 241-TY tank farms that also monitor subsurface conditions. These wells are:

2W-11-24	2W-14-2	2W-14-5	2W-14-6
2W-14-10	2W-15-3	2W-15-4	2W-15-6
2W-15-7	2W-15-10	2W-15-11	

The UN-200-W-17 and UN-200-W-100 UPRs are associated with the 241-TX tank farm and are discussed under their own headings.

Table 7-4. Summary of 241-TX Tank Farm Waste Volumes and Waste Streams.

Tank	Status	Supernatant Liquid (gal)	Sludge (gal)	Saltcake (gal)	Total Waste (gal)	Waste Height (in)	Waste Stream	Supernatant Waste Stream
101	sound	3,000	84,000	0	87,000	39	1	S1, S2, S3, S12, S8, S10, S14, S6, S9, S7 S4, S11 [from 241-C, -BX, -SX, and -TX tanks]
102	sound	0	0	113,000	113,000	49	1, 2	S1, S4 [from 241-TX tanks]
103	sound	0	157,000	0	157,000	65	1, 2	S5, S3, S7
104	sound	1,000	0	64,000	65,000	31	1, 2	S1, S8, S9, S10, S3 [from 241-TY & -TX tanks]
105	assumed leak	0	0	609,000	609,000	229	1, 2	S1, S8, S9 [from 241-BX and -SX tank farms]
106	sound	0	0	453,000	453,000	172	1,2,3	S1, S4, S5, S8, S9, S2 [from 241-TX tanks]
107	assumed leak	1,000	0	35,000	36,000	21	1, 2	S5, S1 [from 241-TX tanks]
108	sound	0	0	134,000	134,000	56	1,2,4	S11, S3, S4 [from 241-TX and -TY tanks]
109	sound	0	0	384,000	384,000	147	5, 2	S12, S4 [from 241-T, -TX, and -TY tanks]
110	assumed leak	0	0	462,000	462,000	176	2, 5	
111	sound	0	0	370,000	370,000	142	2, 5	S3 [from 241-TX tanks]
112	sound	0	0	649,000	649,000	244	2, 5	S4 [from 241-TX tanks]
113	assumed leak	0	0	607,000	607,000	228	2	S4 [from 241-TX tanks]
114	assumed leak	0	0	535,000	535,000	202	2	S12, S4 [from 241-TX tanks]
115	assumed leak	0	0	640,000	640,000	240	2,3,6,7	S5,S11,S2,S4 [from 241-U,-S,-T, and -TX tanks]
116	assumed leak	0	0	631,000	631,000	237		S4 [from 241-TX tanks]
117	assumed leak	0	0	626,000	626,000	235		S12, S4 [from 241-TX tanks]
118	sound	0	0	347,000	347,000	134	7, 8, 3 9, 10	S3, S12, S4, S11, S13, S2 [from 241-T, -TX, -TY, and -U tanks]

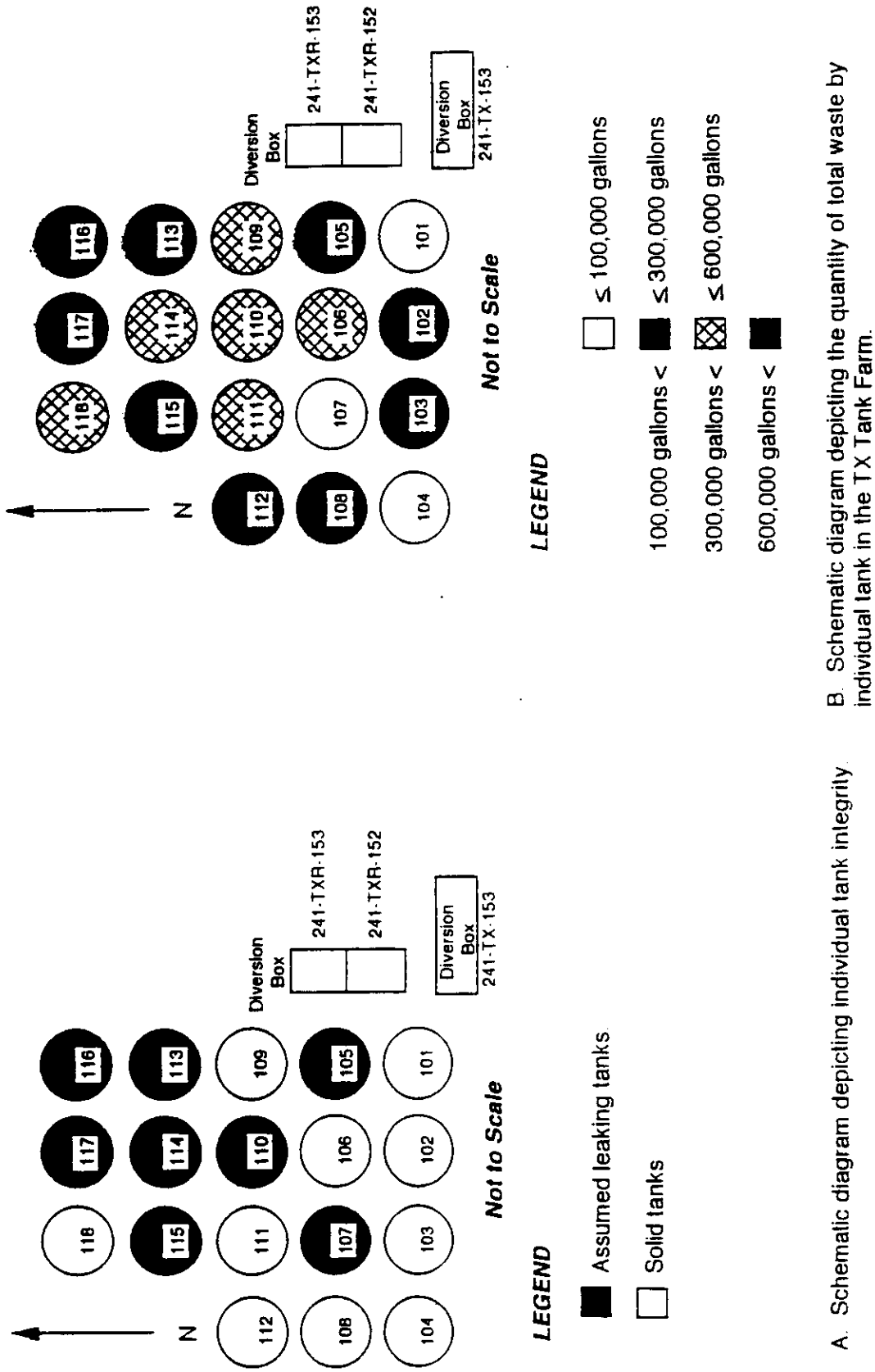
Notes: Non-supernatant Waste Stream

1 = Bismuth phosphate metal waste
2 = 242-T evaporator waste
3 = tributyl phosphate waste
4 = REDOX high-level waste
5 = Bismuth phosphate first-cycle waste
6 = coating waste
7 = decontamination waste
8 = 242-T evaporator feed tank waste
9 = 234-Z and 235-Z buildings waste
10 = caustic solution

Supernatant Waste Stream

S1 = REDOX high-level waste
S2 = coating waste
S3 = tributyl phosphate waste
S4 = evaporator bottoms
S5 = bismuth phosphate metal waste
S6 = PUREX low-level waste
S7 = partial neutralization feed
S8 = REDOX ion exchange waste
S9 = organic wash waste
S10 = B Plant low-level waste
S11 = decontamination waste
S12 = bismuth phosphate first-cycle waste
S13 = partial neutralization feed
S14 = B Plant high-level waste

Figure 7-3. 241-TX Tank Farm Tank Integrity and Waste Volumes.



A. Schematic diagram depicting individual tank integrity

B. Schematic diagram depicting the quantity of total waste by individual tank in the TX Tank Farm.

7.2 241-TX-101 TANK

The cover blocks for the 241-TX-101 tank were sealed in January 1982. However, intrusions of precipitation, via the 241-TXR-152 diversion box, were demonstrated in October 1982. Dry wells, the only means of leak detection for this tank, have remained stable through 1977 (Stalos and Walker 1977).

7.3 241-TX-102 TANK

Dry wells, the only means of leak detection for the 241-TX-102 tank, have remained stable through 1977 (Stalos and Walker 1977).

7.4 241-TX-103 TANK

In 1977, two exploratory dry wells (51-03-01 and 51-03-11) were drilled to acquire additional data to evaluate high-scintillometer measurements in well 51-03-12 at the 51 ft level (see 241-TX-107, Section 7.6). Activity in dry wells associated with the 241-TX-107 leak plume appear to have stabilized (1981) with the exception of well 51-03-09, which has low-level activity, approximately 100 counts per second (ct/s), at the 60 ft and 69 ft levels. Dry wells, the only means of leak detection for this tank, have remained stable through 1977 (Stalos and Walker 1977).

7.5 241-TX-104, 241-TX-105, 241-TX-106, 241-TX-108, 241-TX-109, 241-TX-111, 241-TX-112, 241-TX-113 TANKS, AND UPR-200-W-129

Dry wells, the only means of leak detection for these tanks, have remained stable through 1977 (Stalos and Walker 1977).

The UN-200-W-129 UPR is associated with the 241-TX-113 tank. The UPR occurred on January 7, 1971, while leak testing a new jumper assembly an employee closed a valve in a pump pit that caused a caustic radioactive solution to spray up through the pit cover. The employee was decontaminated, the area was surveyed, and the pump pit was hosed down (Radiation Occurrence Report, January 11, 1971).

7.6 241-TX-107 TANK/UPR-200-W-149

High levels of radioactivity have been found in the 51-07-18 dry well, strongly suggesting that liquid escaping from tank 241-TX-107 is the source of the activity. The tank was confirmed as a source in May 1984. The leak has been designated UPR-200-W-149. During July 1977, after the tank was first classified as possibly leaking, the tank was pumped to a minimum level to remove as much of the supernatant material as possible (BHI 1994).

7.7 241-TX-110 TANK

On March 27, 1974, the liquid level in the tank was reportedly 0.5 in. lower than expected. The tank was removed from service for observation. During the observation period no further declines in fluid level were observed and the dry well showed no readings above normal background. The decline in water level was assumed to be associated with loss to the off-gas system (Stalos and Walker 1977).

7.8 241-TX-114 TANK

All the dry wells surrounding this tank have activity at 43 ft. Well 51-14-04 displayed an extensive profile change below the 48-ft level in 1977 and 1978 (BHI 1994).

7.9 214-TX-115 TANK

Tank 214-TX-115 was designated a "dormant" leaker in February 1975 because of increasing radiation peaks observed in nearby dry wells (Stalos and Walker 1977). The tank is filled with saltcake to a depth of 20 ft, containing the second greatest quantity of waste in the tank farm, only 241-TX-112 contains more waste (BHI 1994).

7.10 241-TX-116 TANK

Diatomaceous earth was added to this tank and approximately 100,000 gal of supernatant fluid was removed in an unsuccessful stabilization attempt. Radiation monitoring of the 51-16-11 dry well in 1975 suggest the tank was still leaking. One more attempt to remove the remaining fluid was unsuccessful (Stalos and Walker 1977).

7.11 241-TX-117 TANK

Photographs taken of the inside of the 241-TX-117 tank in November 1969, show a radial crack in the concrete dome. Diatomaceous earth was added to this tank in an unsuccessful stabilization attempt (Stalos and Walker 1977).

7.12 241-TX-118 TANK

On February 24, 1991, the 241-TX-118 tank contained up to 3 moles of ferocyanide. The waste had a maximum temperature of 75 °F. The tank contains potentially high concentrations of organic salts (Hanlon 1991).

7.13 241-TX-153 DIVERSION BOX/UPR-200-W-126

The 241-TX-153 diversion box is located in the southeast corner of the 241-TX tank farm, just inside the chain-link fence barricade, southeast of the 241-TX-101 tank at the junction of encasements 7-66 and 2-24. It is an inactive waste site that was used between 1949 and July 1982 (BHI 1994).

The unit was used for transfer of waste solution from processing and decontamination operations. This diversion box transfers waste between encasement 7-66 and the 241-TXR-152 and 241-TXR-153 diversion boxes and crib 216-T-19, and drains to the 241-TX-302A catch tank (Hanford drawing H-2-44511, Sheet 110). The unit has been isolated and stabilized with a spray-foam covering to prevent precipitation infiltration (site visit by authors, September 1991).

Leak detection and air monitoring are performed continuously within the 241-TX tank farm (DOE-RL 1987).

7.14 241-TX-302A CATCH TANK

The 241-TX-302A catch tank is located approximately 50 ft south of the 241-TX-153 diversion box, inside the barricade for the 241-TX tank farm. It was used for the transfer of waste solutions from processing and decontamination operations (BHI 1994), and is connected to the 241-TX-153 diversion box and 241-TX-302X catch tank (Hanford drawing H-2-44511, Sheet 110). Waste volumes handled by the tank were variable, depending on plant operation (BHI 1994).

7.15 241-TXR-152 AND 241-TXR-153 DIVERSION BOXES

These diversion boxes abut each other and are located approximately 150 ft north of the 241-TX-153 diversion box, inside the 241-TX tank farm barricade, east of the 241-TX-105 tank. Both units were active from 1949 through the latter part of 1980, and were used for transfer of waste solution from processing and decontamination operations.

The units have been isolated and stabilized with a spray-foam covering to prevent infiltration of precipitation. There is a 12-ft-high gravel pile with an asphalt ramp on the eastside of the tank farm. What appears to be access portals are clearly visible on top of the pile and are assumed to be associated with the diversion box covers (site visit by authors, September 1991).

Leak detection and air monitoring are performed continuously within the 241-TX tank farm (DOE-RL 1987).

7.16 242-T-151 DIVERSION BOX

This small diversion box is adjacent to the southeast side of the 241-TX-116 tank, in the northeast corner of the 241-TX tank farm. It is connected to the 241-TX-153 diversion box, 241-TX-113, 241-TX-114, 241-TX-116, 241-TX-117 tanks, and the 242-T evaporator (Hanford drawing H-2-44511, Sheets 110 and 118).

7.17 241-TY TANK FARM

The 241-TY tank farm consists of a series of six buried SSTs that contain mixed waste. It is located in the northwest portion of the 200 West Area, approximately 2,400 ft southwest of the 221-T canyon building, directly north of the 241-TX tank farm. The surface elevation of the tank farm is 670 ft amsl, and the depth to groundwater below the tank farm is approximately 199 ft (BHI 1994).

There are six tanks in the tank farm, numbered 241-TY-101 through 241-TY-106. All the tanks are currently inactive and each has undergone initial stabilization and has a status of interim isolation (BHI 1994). Since all the tanks are of similar construction and are located adjacent to one another, their history will be discussed as a single topic.

At the present time, the entire tank farm, including the 241-TY-151 and 241-TY-153 diversion boxes, and 241-TY-302A and 241-TY-302B catch tanks, is surrounded by a chain-link fence, topped with three strands of barbed wire. The 241-TY tank farm is paved with gravel (site visit by authors, September 1991).

All tanks in the 241-TY tank farm are typical of SST construction at Hanford, and are of second generation design (McKenney and Blevins 1983). Tanks are composed of a 24-ft-high carbon-steel liner with a reinforced concrete shell that has an inside height of 37 ft. Each tank bottom is 45 ft below grade and the tanks are covered with about 6 ft of overburden. Each tank is 75 ft in diameter and their bottoms are dish shaped. Tank operating depth is 23 ft, leaving 1 ft of freeboard (BHI 1994). The 241-TY tank farm was constructed to receive nonboiling waste, and each tank has a capacity of 758,000 gal.

The waste stream received by the 241-TY tank farm was generated largely from the bismuth phosphate process used in the 221-T canyon building. The waste stream consisted of metal waste containing all of the uranium with up to 90% of the original fission products, coating wastes from fuel rod processing operations containing small amounts of fission products, decontamination waste containing up to 10% of the original fission activity and as much as 1% plutonium. The 241-TY tank farm also received second decontamination cycle waste that generally contained less than 0.1% of the original fission activity and as much as 1% plutonium. Other waste streams received by the 241-TY tank farm include waste from the solidification program and the uranium recovery program. The supernatant liquid transferred to the tanks during their operation did not contain complexed waste (BHI 1994).

Table 7-5 provides a breakdown of the quantities and specific waste currently stored in each tank. It is clear from the table that the majority of waste stored in the 241-TY tank farm is in the form of sludge and that only a minor amount of supernatant liquid and some interstitial liquid is available for infiltration into the vadose zone. Figure 7-4 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the 241-TY tank farm. Note, with the exception of the 241-TX-102 tank, all tanks in the 241-TY tank farm are assumed to be leaking.

Several dry wells within the 241 tank farms are used to monitor the soil for radioactivity and serve as one form of leak detection. In addition, there are a series of groundwater monitoring wells around the 241-TX and 241-TY tank farms that also monitor subsurface conditions. These wells are:

2W-11-24	2W-14-2	2W-14-5	2W-14-6
2W-14-10	2W-15-3	2W-15-4	2W-15-6
2W-15-7	2W-15-10	2W-15-11	

Table 7-5. Summary of 241-TY Tank Farm Waste Volumes and Waste Streams.

Tank	Status	Supernatant Liquid (gal)	Sludge (gal)	Saltcake (gal)	Total Waste (gal)	Waste Height (in)	Waste Stream	Supernatant Waste Stream
101	assumed leak	0	118,000	0	118,000	50	5	S12, S3, S4 [from 241-TY, -TX, and -SX tanks]
102	sound	0	0	64,000	64,000	31		S1, S10, S9, S8, S4 [from 241-TX & -TY tanks]
103	assumed leak	0	162,000	0	162,000	67	5, 3	S12, S3, S9, S8, S2, S4, S11 [from 241-BX, -T, -TY, and -AX tanks]
104	assumed leak	3,000	43,000	0	46,000	24	3,	S8, S9, S12, S3, S11 [from 241-TY & -TX tanks]
105	assumed leak	0	231,000	0	231,000	92	3	
106	assumed leak	0	17,000	0	17,000	14	3	

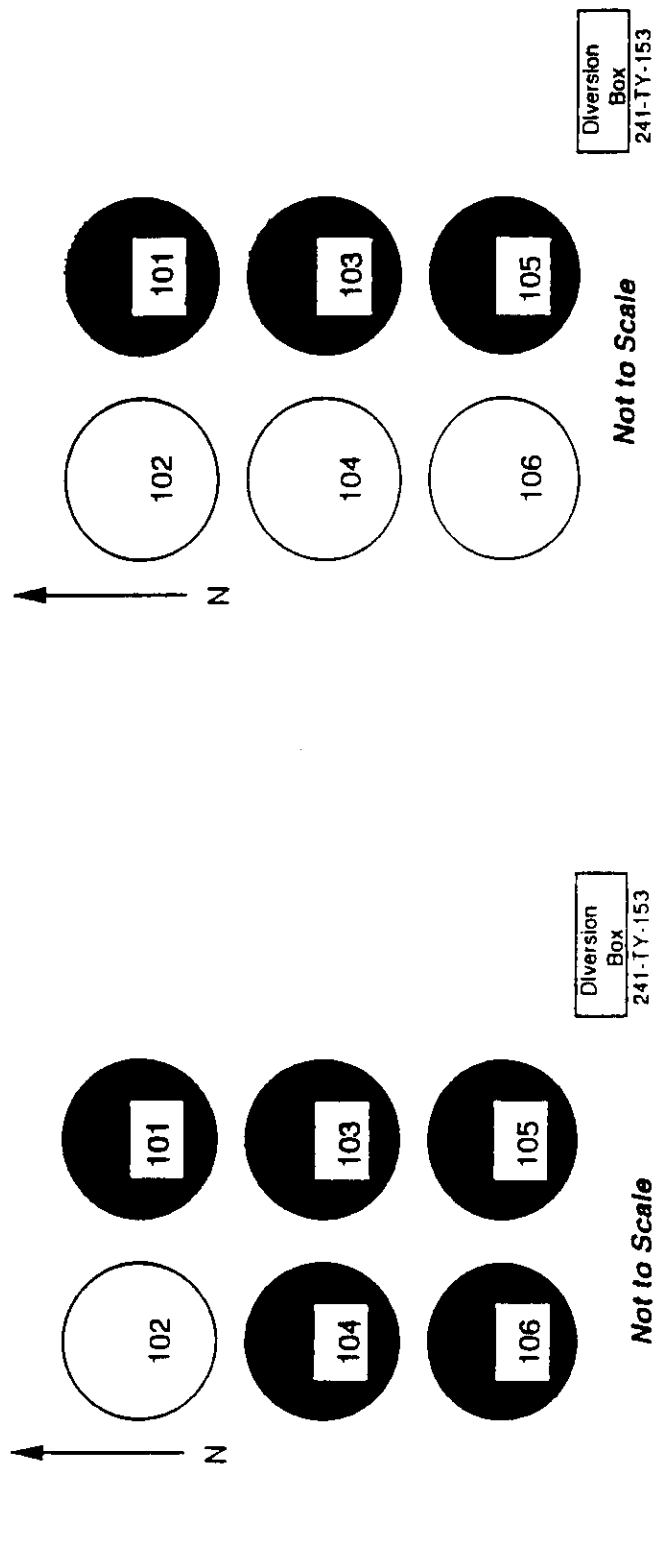
Notes: Non-supernatant Waste Stream

1 = Bismuth phosphate metal waste
2 = 242-T evaporator waste
3 = tributyl phosphate waste
4 = REDOX high-level waste
5 = Bismuth phosphate first-cycle waste
6 = coating waste
7 = decontamination waste
8 = 242-T evaporator feed tank waste
9 = 234-Z and 235-Z buildings waste
10 = caustic solution

Supernatant Waste Stream

S1 = REDOX high-level waste
S2 = coating waste
S3 = tributyl phosphate waste
S4 = evaporator bottoms
S5 = bismuth phosphate metal waste
S6 = PUREX low-level waste
S7 = partial neutralization feed
S8 = REDOX ion exchange waste
S9 = organic wash waste
S10 = B Plant low-level waste
S11 = decontamination waste
S12 = bismuth phosphate first-cycle waste
S13 = partial neutralization feed
S14 = B Plant high-level waste

Figure 7-4. TY Tank Farm Tank Integrity and Waste Volumes.



A. Schematic diagram depicting individual tank integrity.

B. Schematic diagram depicting the quantity of total waste by individual tank in the TY Tank Farm.

7.18 241-TY-101 TANK

In February 1991, this unit contained up to 30 moles of ferocyanide. The waste had a maximum temperature of 75 °F. Dry wells, the only means of leak detection for this tank, have remained stable through 1977 (Stalos and Walker 1977).

7.19 241-TY-102 TANK

This is the only tank in the 241-TY tank farm containing saltcake. Dry well 52-02-11 was drilled in May 1975 to test the validity of using resistivity measurements as a method of leak detection by injecting a salt solution ($NaNO_3$) and monitoring formation response (BHI 1994). In January 1989, the activity in the well increased from approximately 70 ct/s at a depth of 40 ft to about 160 ct/s, and then stabilized (BHI 1994).

7.20 241-TY-103 TANK/UPR-200-W-150

In February 1991, this unit contained up to 30 moles of ferocyanide. The waste had a maximum temperature of 65 °F. In February 1976, overflow of the 241-TX-155 diversion box catch tank flowed back into the unit, depositing 1.3 in. of sludge waste. Dry wells showed no significant increase that was attributable to this flooding event (UPR-200-W-150). The unit was removed from service in October 1973 because two dry wells, 52-03-06 and 52-03-03, had shown radiation increases, suggesting leakage from this unit or the 241-TY-105 tank. Because the unit contains solids, dry wells are the only means of leak detection, and activity has remained stable (Stalos and Walker 1977).

7.21 241-TY-104 TANK/UPR-200-W-151

In September 1991, this unit contained up to 20 moles of ferocyanide. The waste had a maximum temperature of 72 °F. This tank was classified as a "confirmed leaker" in June 1981 (BHI 1994).

In 1974, approximately 1,400 gal of supernatant leaked (UPR-200-W-151). The leak consisted of REDOX ion-exchange waste, plutonium-uranium reduction extraction organic wash waste, bismuth phosphate first-cycle waste, tributyl phosphate waste, and decontamination waste from the 241-TX and 241-TY tank farms. This was noticed when the liquid level dropped more than the 0.3 in. limit. The P-10 saltwell was pumped as a cleanup effort for this UPR (DOE-RL 1987).

7.22 241-TY-105 TANK/UPR-200-W-152

The 241-TY-105 tank was removed from service as a "confirmed leaker." The UPR-200-W-152 UPR occurred in 1960. The waste is listed as tributyl phosphate of unknown quantity. A saltwell pump system was installed to remove the pumpable interstitial liquid (DOE-RL 1987).

Two dry wells are associated with this site. The radioactivity in both dry wells may be the result of interstitial liquid leakage (BHI 1994).

7.23 241-TY-106 TANK/UPR-200-W-153

The 241-TY-106 tank was designated a "confirmed leaker" and removed from service. The leak has been designated UPR-200-W-153. Routine surveillance of radiation dry wells had indicated a change of profile in dry well 52-06-05, which now appears to have stabilized (BHI 1994). The waste involved is identified as tributyl phosphate in unknown quantities. The tank was stabilized with diatomaceous earth (DOE-RL 1987).

7.24 241-TY-153 DIVERSION BOX

The 241-TY-153 diversion is located in the southeast corner of the 241-TY tank farm, just inside the chain-link fence barricade, southeast of 241-TY-105 and south of the 241-TY-302A catch tank. It is an inactive waste site that was used between 1953 and May 1981 (BHI 1994). The unit was used for transfer of waste solution from processing and decontamination operations. This diversion box interconnects the 241-TX tank farm diversion boxes (241-TX-153 and 241-TX-155) with the 241-TY tank farm. The unit has been isolated and stabilized with a spray covering to prevent infiltration of precipitation (site visit by authors, September 1991).

Leak detection and air monitoring are performed continuously within the 241-TY tank farm (DOE-RL 1987).

7.25 241-TY-302A CATCH TANK

The 241-TY-302A catch tank is located approximately 63 ft north of the 241-TY-153 diversion box, inside the chain-link fence barrier of the 241-TY tank farm. It was used for the transfer of waste solutions from processing and decontamination operations, and is connected to the 241-TY-153 diversion box and the 241-TY tank farm (Hanford drawing H-2-44511, Sheet 118). Waste volumes handled by the 241-TY-302A catch tank were variable, depending on plant operation (BHI 1994). The unit has been isolated and stabilized with a spray covering to prevent infiltration of precipitation (site visit by authors, September 1991).

7.26 241-TY-302B CATCH TANK

The 241-TY-302B catch tank is located approximately 170 ft east of the 241-TY-101 tank. It was used for the transfer of waste solutions from processing and decontamination operations, and is connected to the 241-T-151 diversion box and the 241-TY encasements (Hanford drawing H-2-44511, Sheet 118). Waste volumes handled by the 241-TY-302B catch tank were variable, depending on plant operation (BHI 1994). The unit has been isolated and stabilized with a spray covering to prevent infiltration of precipitation (site visit by authors, September 1991).

7.27 2607-WT SEPTIC TANK

The 2607-WT septic tank is located east of the evaporator, between the 241-TX and 241-TY tank farms. This active sanitary wastewater and sewage septic tank generates approximately 0.02 m^3/d of

waste. The unit is connected to a sanitary tile field (Hanford drawing H-2-1902). The site started operating in 1952 (BHI 1994) (Hanford drawing H-2-44511, Sheet 118).

Neither the septic tank nor the drain field could be definitively identified from outside the chain-link fence barrier. Drawings suggest that the septic tank is beneath the 241-T-601 building. The area around the building is covered with gravel (site visit by authors, October 1991).

7.28 2607-WTX SEPTIC TANK

The 2607-WTX septic tank is active and is located in the southwest corner of the 241-TX tank farm. It is connected to a sanitary tile field (Hanford drawing H-2-42137) and started operating in 1950. The unit generates sanitary wastewater and sewage at a rate of 0.74 m^3/d (BHI 1994).

7.29 UN-200-W-17 UNPLANNED RELEASE

In September 1952, this UPR distributed surface contamination over a 300 ft by 600 ft area along the central portion of the 241-TX tank farm during the transfer of a temporary process waste pump from the 241-TX-106 tank to the 241-TX-114 tank. Contamination also spread to a major construction area adjacent to the southern boundary of the tank farm (Environmental Protection files). Less than 1 g of solvent contaminated with cesium, nobelium, ruthenium, strontium, and zirconium, was dispersed by the wind. Surface readings of 2,000 c/m to a maximum of 35,000 c/m were measured (BHI 1994).

Some of the highly contaminated areas were stabilized with emulsified asphalt. During a site visit by the authors (October 1991) no evidence of barricades or warning signs was found.

7.30 UN-200-W-76 UNPLANNED RELEASE

The UN-200-W-76 UPR consisted of contaminated rabbit fecal pellets that contained: cesium-137, cesium-134, europium-155, europium-154, and strontium-90 (Stenner et al. 1988). The pellets contaminated an area of 50 yd by 100 yd around the 241-TX-155 diversion box. Both the contaminated pellets and soil were removed from the diversion box excavation and taken to dry waste burial. The remaining contamination was covered with clean soil (BHI 1994).

7.31 UN-200-W-100 UNPLANNED RELEASE

The UN-200-W-100 UPR occurred from a leak in the process line leading from the 241-TX-105 tank to the 241-TX-118 tank. Fluid from the process line covered an area approximately 100 ft by 125 ft with first-cycle high-salt neutral/basic waste (Harmon 1975). This waste contained fission products with approximately 10 Ci that generated a maximum dose rate of 4.5 R/h at 4 ft (Stenner et al. 1988). The contaminated area was covered with 1 ft of clean soil (BHI 1994). This site is within the chain-link barricade of the 241-TX tank farm. The entire tank farm is stabilized with gravel (site visit by authors, September 1991).

8.0 OPERABLE UNIT 200-TP-6

The 200-TP-6 Operable Unit consists of the 241-T tank farm. It is located north of 23rd Street adjacent to the junction between 23rd Street and Camden Avenue (Figure 5-1). Most of the tanks within the 241-T tank farm have been operational from approximately 1945 through the mid-1970's (Figure 8-1). The tanks are typical of SSTs at Hanford and none have been ranked as posing a significant risk (Tables 8-1 and 8-2). Table 8-3 summarizes current site conditions, based on several site visits by the authors in September and October 1991.

8.1 241-T TANK FARM

The 241-T tank farm consists of 12 533,000-gal and four 55,000-gal buried SSTs containing mixed waste (DOE-RL 1987). The 241-T tank farm is located about 2,000 ft west of the 221-T canyon building, directly north of the 241-TY tank farm and 23rd Street (Esobar 1986). The ground elevation of the 241-T tank farm is 674 ft amsl, with the dished bottoms of the tanks 37 ft below grade and an operating depth of 17 ft for the 12 larger tanks, and an inner structure height of 25 ft for the smaller tanks (Anderson and Mudd 1979). The tops of the tanks are covered with about 8 ft of overburden for shielding purposes (RHO 1982).

The 12 533,000-gal tanks are numbered 241-T-101 through 241-T-112. The four 55,000-gal tanks are numbered 241-T-201 through 241-T-204. All the tanks are inactive. Each tank has been initially stabilized and put in interim isolation (Heeter 1988). Since the tanks are of similar construction and are located in the same vicinity, their general operational history will be discussed as a whole. Individual tank summaries will follow this section, giving specific details on each tank, as well as the associated sites such as diversion boxes, catch tanks, and UPRs.

At present, the 241-T tank farm is enclosed by a 6-ft-high chain-link fence. Drilling operations are being performed at the northeast side of the tank farm. The tanks are marked by yellow iron pipes and foam-covered pads. The 241-T tank farm is covered with gravel and vegetation is absent. The gravel is at grade over most of the area, but is slightly above grade in the northeast section of the 241-T tank farm. Numerous sealed drums are stored next to the south fence (site visit by authors, September 1991).

The tanks are comprised of a carbon-steel liner within a reinforced concrete shell. The 533,000-gal tanks have a 75 ft diameter while the 55,000-gal tanks have a diameter of 20 ft (RHO 1982) (Hanford drawing H-2-1741 R3). The four 55,000-gal tanks are interconnected, with 241-T-201, and 241-T-202 going directly to the 261-T-32 crib. The larger tanks are arranged in groups of three that cascade from one to another, such that the bulk waste is retained in the first tank it is pumped to. Cooling, precipitation, and gravity settling of the waste stream happens in each tank, thus the majority of the radionuclides are found on the tank bottoms. Gas associated with the waste is vented directly to the atmosphere.

Figure 8-1. Summary of the Operational Periods for Operable Unit 200-TP-6.
(sheet 1 of 2)

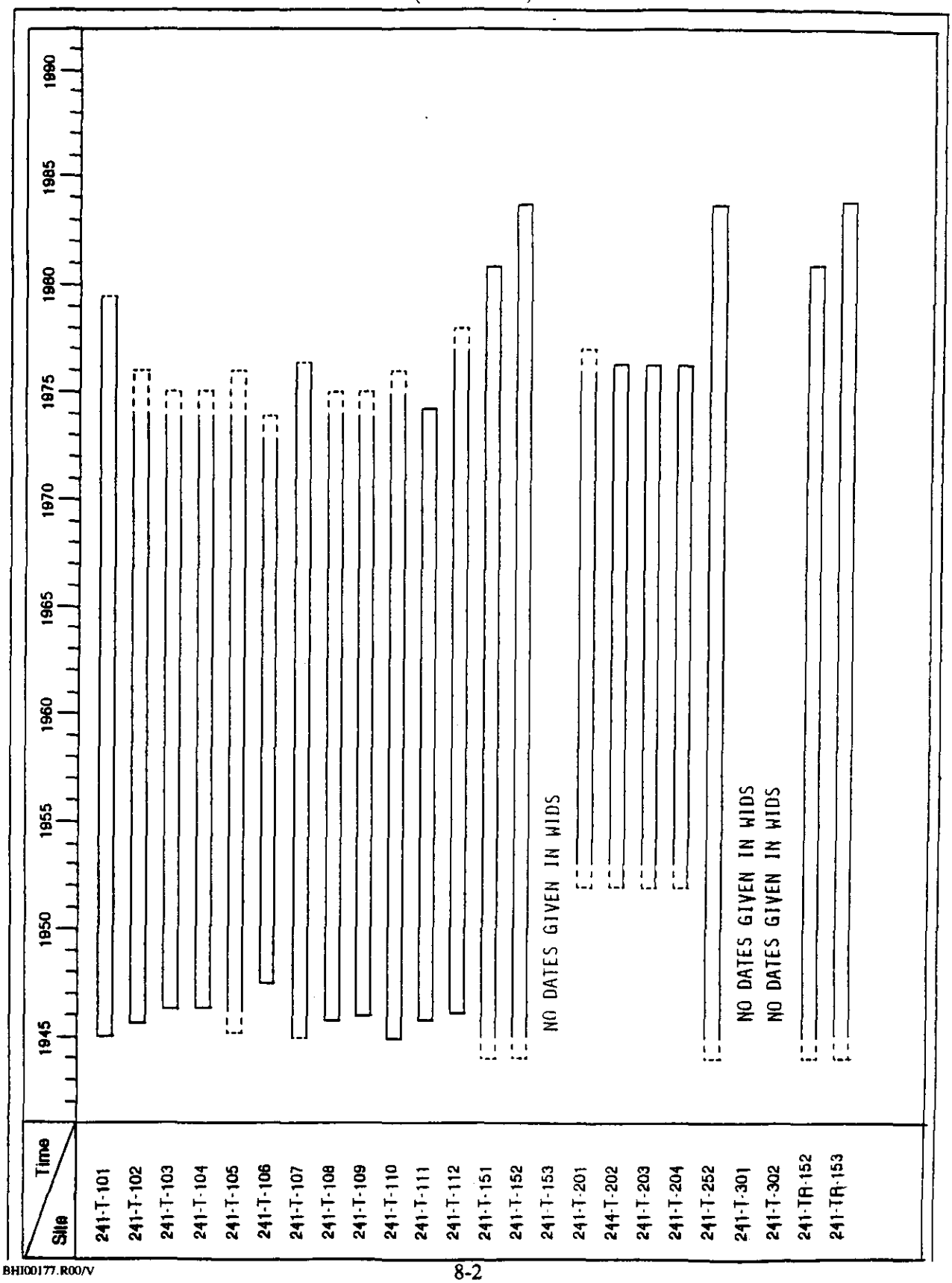


Figure 8-1. Summary of the Operational Periods for Operable Unit 200-TP-6.
(sheet 2 of 2)

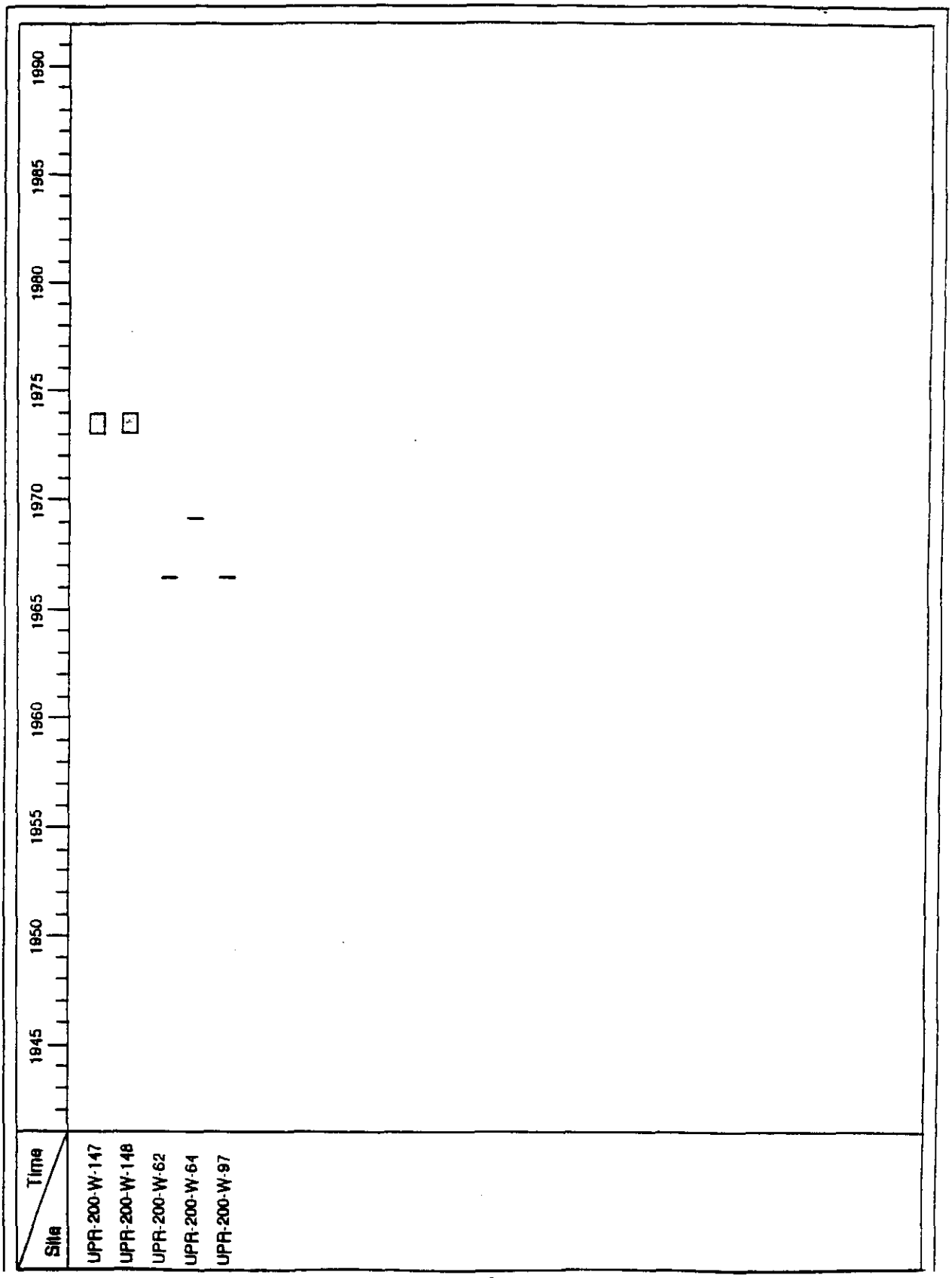


Table 8-1. Site Location and Waste Type Summary Table for Operable Unit 200-TP-6 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
241-T-101	Single-Shell Tank	Inactive	N43648 W75638	Mixed Waste
241-T-102	Single-Shell Tank	Inactive	N43648 W75738	Mixed Waste
241-T-103	Single-Shell Tank	Inactive	N43648 W75838	Mixed Waste
241-T-104	Single-Shell Tank	Inactive	N43548 W75638	Mixed Waste
241-T-105	Single-Shell Tank	Inactive	N43548 W75738	Mixed Waste
241-T-106	Single-Shell Tank	Inactive	N43548 W75838	Mixed Waste
241-T-107	Single-Shell Tank	Inactive	N43448 W75638	Mixed Waste
241-T-108	Single-Shell Tank	Inactive	N43448 W75738	Mixed Waste
241-T-109	Single-Shell Tank	Inactive	N43448 W75838	Mixed Waste
241-T-110	Single-Shell Tank	Inactive	N43348 W75638	Mixed Waste
241-T-111	Single-Shell Tank	Inactive	N43348 W75738	Mixed Waste
241-T-112	Single-Shell Tank	Inactive	N43348 W75838	Mixed Waste
241-T-151	Diversion Box	Inactive	N43296 W75367	Mixed Waste
241-T-152	Diversion Box	Inactive	N43253 W75422	Mixed Waste
241-T-153	Diversion Box	Inactive	N43350 W75523	Mixed Waste
241-T-201	Single-Shell Tank	Inactive	N43473 W75938	Mixed Waste
241-T-202	Single-Shell Tank	Inactive	N43423 W75938	Mixed Waste
241-T-203	Single-Shell Tank	Inactive	N43373 W75938	Mixed Waste
241-T-204	Single-Shell Tank	Inactive	N43323 W75938	Mixed Waste
241-T-252	Diversion Box	Inactive	N43233 W75901	Mixed Waste
241-T-301	Catch Tank	Inactive	N43235 W75837	Mixed Waste
241-T-302	Catch Tank	Inactive	N43550 W75500	Mixed Waste
241-TR-152	Diversion Box	Inactive	N43522 W75520	Mixed Waste
241-TR-153	Diversion Box	Inactive	N43425 W75520	Mixed Waste
UN-200-W-62	Unplanned Release	Inactive	N43215 W75450	Mixed Waste
UN-200-W-64	Unplanned Release	Inactive	N43210 W75450	Mixed Waste
UN-200-W-97	Unplanned Release	Inactive	N43163 W75348, N43163 W75468, N43023 W75468, N43023 W75348	Mixed Waste
UPR-200-W-147	Unplanned Release	Inactive	N43647 W75837	Mixed Waste
UPR-200-W-148	Unplanned Release	Inactive	N43447 W75834	Mixed Waste

Table 8-2. Operational Data and Waste Volumes for Operable Unit 200-TP-6 (BHI 1994).

Site	State	Start Date	End Date	UPR Occurrence Date	Dim Ref	Length (ft)	Width (ft)	Dispo. Depth (ft)	Volume of Pu Contam. Soil (cu m)	Volume of Waste Disposed (cu m OR L)	PNL Hazard Ranking	Associated UPR(s)
241-T-101	Liquid	12/44 ?1945 [544]?	1979		Top	0	0	0	0	0	0.00	
241-T-102	Liquid	September 1945	1976 ?1974 [227]?		Top	0	0	0	0	0	0.00	
241-T-103	Liquid	March 1946	1974		Top	0	0	0	0	0	0.00	UPR-200-W-147
241-T-104	Liquid	March 1946	1974		Top	0	0	0	0	0	0.00	
241-T-105	Liquid	1945	1976 ?1974 [227]?		Top	0	0	0	0	0	0.00	
241-T-106	Liquid	June 1947	1973		Top	0	0	0	0	0	0.00	UPR-200-W-148
241-T-107	Liquid	12/44 ?1945 [544]?	April 1976		Top	0	0	0	0	0	0.00	
241-T-108	Liquid	September 1945	1974		Top	0	0	0	0	0	0.00	
241-T-109	Liquid	December 1945	1974		Top	0	0	0	0	0	0.00	
241-T-110	Liquid	December 1944	1976		Top	0	0	0	0	0	0.00	
241-T-111	Liquid	October 1945	March 1974		Top	0	0	0	0	0	0.00	
241-T-112	Liquid	January 1946	1977		Top	0	0	0	0	0	0.00	
241-T-151	Liquid	1944	October 1980		Top	16	9	14	0	0	0.00	
241-T-152	Liquid	1944	September 1983		Top	28	9	12	0	0	0.00	
241-T-153	Liquid				Top	28	9	12	0	0	0.00	
241-T-201	Liquid	1952	1976		Top	0	0	0	0	0	0.00	
241-T-202	Liquid	1952	April 1976		Top	0	0	0	0	0	0.00	
241-T-203	Liquid	1952	April 1976		Top	0	0	0	0	0	0.00	
241-T-204	Liquid	1976	April 1976		Top	0	0	0	0	0	0.00	
241-T-252	Liquid	1944	September 1983		Top	36	9	12	0	0	0.00	
241-T-301	Liquid				Top	0	0	0	0	0	0.00	
241-T-302	Liquid				Top	0	0	0	0	0	0.00	
241-TR-152	Liquid	1944	November 1980		Top	37	33	12	0	0	0.00	
241-TR-153	Liquid	1944	November 1983		Top	28	15	16	0	0	0.00	
UN-200-W-62	Liquid			May 4, 1966	Top	120	6	0	0	0	1.31	
UN-200-W-64	Liquid			February 13, 1969	Top	0	0	0	0	0	0.86	
UN-200-W-97	Liquid			May 1966	Top	0	0	0	0	0	1.04	
UPR-200-W-147	Liquid			1973	Top	0	0	25	0	0	0.00	
UPR-200-W-148	Liquid			1973	Top	0	0	108	0	0	0.00	

Table 8-3. Summary of Current Site Conditions for Operable Unit 200-TP-6.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
241-T-101	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	2.0	None	Inside Fenced Area	0	0
241-T-102	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	1.0	None	Inside Fenced Area	0	0
241-T-103	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-104	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	3.0	None	Inside Fenced Area	0	0
241-T-105	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	2.0	None	Inside Fenced Area	0	0
241-T-106	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-107	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	3.0	None	Inside Fenced Area	0	0
241-T-108	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	1.5	None	Inside Fenced Area	0	0
241-T-109	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-110	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	4.0	None	Inside Fenced Area	0	0
241-T-111	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	2.0	None	Inside Fenced Area	0	0
241-T-112	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-151	Chain-Link Fence	Could not determine	None	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-T-152	Chain-Link Fence	Could not determine	None	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-T-153	Chain-Link Fence	Could not determine	None	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-T-201	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-202	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-203	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-204	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0
241-T-252	Chain-Link Fence	Could not determine	Could not determine	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-T-301	Chain-Link Fence	Could not determine	Metal Post with Plaque	None/Unknown	0.0	None	Inside Fenced Area	0	0
241-T-302	Chain-Link Fence	Could not determine	Metal Post with Plaque	None/Unknown	0.0	None	Inside Fenced Area	0	0
241-TR-152	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
241-TR-153	Chain-Link Fence	Surface Contamination	Could not determine	Sprayed Plastic Foam	0.3	None	Inside Fenced Area	0	0
UN-200-W-62	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
UN-200-W-64	None	None	None	None/Unknown	0.0	None	None	0	0
UN-200-W-97	Light Chain	Surface Contamination	None	Gravel/Soil Cover	3.0	None	None	0	0
UPR-200-W-147	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	Brush/Grass	Inside Fenced Area	0	0
UPR-200-W-148	Chain-Link Fence	Surface Contamination	Could not determine	Gravel/Soil Cover	0.1	None	Inside Fenced Area	0	0

The waste steams discharged to the 533,000-gal tanks were primarily bismuth phosphate, first- and second-cycle metal waste and tributyl phosphate waste from the 221-T canyon building, and coating waste, ion-exchange waste and high-level waste from the REDOX facility. Also received were PNL waste, B Plant low-level waste, decontamination waste, evaporator bottoms, and 224-U waste from 241-B, 241-BX, 241-C, 241-SX, and 241-T tank farms (Jungfleisch 1983). The waste stream sent to the four 55,000-gal tanks was 224-U building waste. The fluid transferred to all the tanks during operations contained only noncomplexed waste (Hanlon 1991). Table 8-4 lists the assumed total concentration of contaminants contained in all 16 tanks of the tank farm used to determine the PNL Hazard Ranking System (Stenner et al. 1988).

During 1977 and 1978, all tanks, except T-103, T-106, T-109, T-112, and T-204 had P-10 saltwell pumping performed to remove the interstitial liquid from the bottom sludges (Stenner et al. 1988).

The 241-T tank farm diversion boxes were used for the transfer of waste solutions from processing and decontamination operations. The volumes were variable depending on specific plant operation (DOE-RL 1987). Diversion boxes and receiving vaults drain to catch tanks or SSTs. They are designed to contain leaks from transfers and drainage from operations within the tank farm. Units of this type are concrete reinforced and have "Hanford style" 3- or 4-in. nozzles. The majority of the diversion boxes have been isolated and weather covered (Harmon 1975). Leak detection and air monitoring are performed continuously within the 241-T tank farm (DOE-RL 1987).

8.2 241-T-101 TANK

Shift logs, internal memos, and drilling and gamma logs for dry wells at this unit suggest a spill of an estimated volume of 40,000 gal occurred some time before 1973. The duration and quantity of the release is unknown. Based on one vadose monitoring well, high-level wastes penetrated up to 122 ft beneath the surface. Additional characterization is needed to confirm and/or assess the areal and vertical distribution of contaminants from their suspected tank overflow event (Johnson 1988).

8.3 241-T-102 TANK

Dry well radiation levels have remained stable during the review period, and liquid level measurements have indicated a slight 0.20 in. increase. Dry wells will no longer be the primary means of leak detection as photographs taken on June 29, August 1, and November 8, 1983, show the flow indicator controller (FIC) plummet now contacting a clear liquid surface (Stalos and Walker 1977).

8.4 241-T-103 TANK/UPR-200-W-147

This tank was taken out of service because of a liquid level decrease of 0.30 in. Radiation readings in accompanying dry wells are attributed to the 241-T-106 tank leak.

During the mid 1970's dry well and liquid measurements have remained stable (Stalos and Walker 1977). The tank is thought to have "questionable integrity" and is an assumed leaker (Hanlon 1991).

Table 8-4. Summary of 241-T Tank Farm Waste Volumes and Waste Streams.

Tank	Status	Supernatant Liquid (gal)	Sludge (gal)	Saltcake (gal)	Total Waste (gal)	Waste Height (in)	Waste Stream	Supernatant Waste Stream
101	sound	30,000	103,000	0	133,000	44	1, 3, 16	S1, S2, S8, S10, S4, S11, S18, S6 [from 241-BX, -SX, -T]
102	sound	13,000	19,000	0	32,000	7	1, 6	S1, S4, S16, S10 [from 241-C, -T tanks]
103	assumed leak	4,000	23,000	0	27,000	5	1, 6	S10, S8, S1, S4 [from 241-C, -T tanks]
104	sound	3,000	442,000	0	445,000	157	5	
105	sound	0	98,000	0	98,000	31	1,5,6, 7,11,12	S10, S11, S12, S17 [from 241-BX, -S, and -T tank farms]
106	assumed leak	2,000	19,000	0	21,000	3	1	S2, S10, S17 [from 241-T, -S, and -U farms]
107	assumed leak	9,000	171,000	0	180,000	61	1, 3	S3, S12, S17, S2 [from 241-C, -BX, -T tanks]
108	assumed leak	0	44,000	0	44,000	12	3,5,12	S3, S4, S10, S12, S17 [from 241-TX & -T tanks]
109	assumed leak	0	58,000	0	58,000	17	5,3,13	S12, S3, S10, S17, S18 [from 241-T, -TX farms]
110	sound	3,000	376,000	0	379,000	133	11, 14	None
111	assumed leak	2,000	456,000	0	458,000	162	11, 14	
112	sound	7,000	60,000	0	67,000	20	11,15,7	S10, S17 [from 241-T]
201	sound 1,000	28,000	0	29,000	152	14		
202	sound 0	21,000	0	21,000	109	14		
203	sound 0	35,000	0	35,000	183	14		
204	sound 0	38,000	0	38,000	197	14		

Notes: Non-supernatent Waste Stream
1 = Bismuth phosphate metal waste
2 = 242-T evaporator waste
3 = tributyl phosphate waste
4 = REDOX high-level waste
5 = Bismuth phosphate first-cycle waste
6 = coating waste
7 = decontamination waste
8 = 242-T evaporator feed tank waste
9 = 234-Z and 235-Z buildings waste
10 = caustic solution
11 = Bismuth phosphate second-cycle waste
12 = Hanford lab operation waste
13 = evaporator bottoms
14 = 224-U building waste
15 = PNL waste
16 = REDOX coating waste

Supernatent Waste Stream
S1 = REDOX high-level waste
S2 = coating waste
S3 = tributyl phosphate waste
S4 = evaporator bottoms
S5 = bismuth phosphate metal waste
S6 = 224-U building waste
S7 = partial neutralization feed
S8 = REDOX ion exchange waste
S9 = organic wash waste
S10 = B Plant low-level waste
S11 = decontamination waste
S12 = bismuth phosphate first-cycle waste
S13 = partial neutralization feed
S14 = B Plant high-level waste
S15 = PUREX low-level waste
S16 = B Plant ion-exchange waste
S17 = ion exchange waste
S18 = PNL waste

This tank has one UPR associated with it (UPR-200-W-147). While monitoring wells were being drilled to track the extent of the 241-T-106 tank leak, contamination was encountered near the 241-T-103 tank. Subsequent investigations revealed that a leak resulted from a failed grout seal in a spare entry line. The volume of the leak has been determined to be about 5 m^3. The data shows the radioactivity has preferentially moved toward the southeast. The greatest depth that the liquid waste penetrated is about 25 m below the ground surface and is about 37 m above the water table (DOE-RL 1987).

8.5 241-T-104 TANK

The 241-T-104 tank was retired from service when it was filled with solids. Dry wells are the only means of leak detection because the manual tape pencil plummet is contacting sludge. The dry wells around the tank have remained stable during the mid-1970's (Stalos and Walker 1977).

8.6 241-T-105 TANK

Dry wells are the only means of leak detection in this tank because the FIC plummet is contacting sludge. The dry well activity is associated with the 241-T-106 tank leak plume, and has remained stable during the mid-1970's (Stalos and Walker 1977).

8.7 241-T-106 TANK/UPR-200-W-148

The 241-T-106 tank was pumped to a minimum heel in June 1973 and was further pumped down to a residual layer of less than 6 in. in July 1974 (Stalos and Walker 1977).

The 241-T-106 tank was removed from service and categorized as a confirmed leaker because of a large UPR. The UPR-200-W-148 was assumed to have occurred on April 20, 1973, during a routine filling operation; however, the leak was not detected until June 8, 1973. Upon investigation of the leak, it was determined that the total loss of fluid to the ground had been 115,000 gal, containing approximately 40,000 Ci of cesium-137; 14,000 Ci of strontium-90; 4 Ci of plutonium; and various fission products (Table 8-5). It is estimated the leak contaminated over 25,000 m^3 of soil. The exact cause of the leak is still unknown, but it probably resulted from corrosion of the ageing (29 to 30 yr) carbon-steel tank by the caustic waste solution held in the tank over its operational life (anonymous).

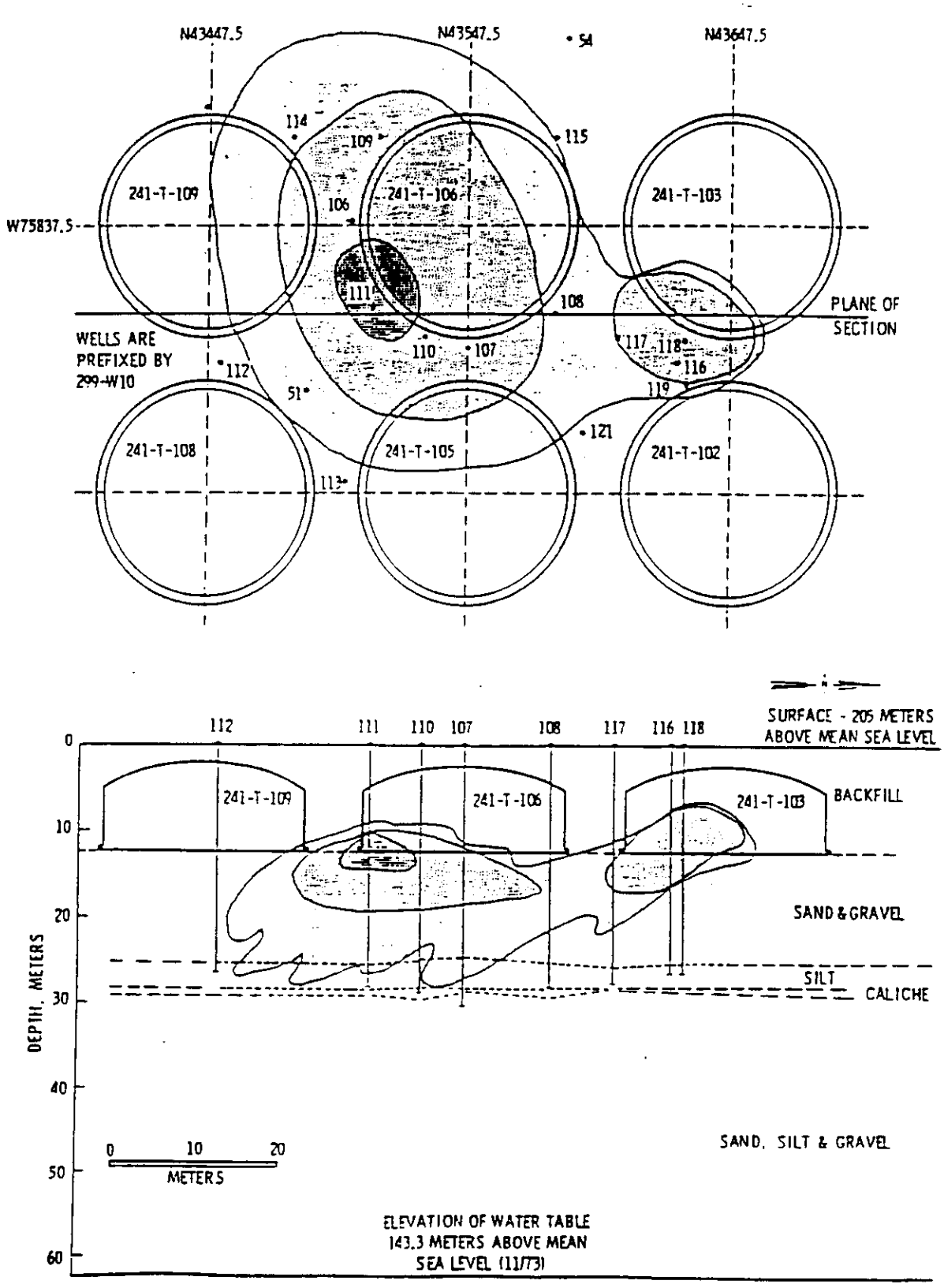
Test boreholes were made during 1975 to determine the extent of the leak plume for evidence of movement. Test results indicate that the plume is essentially stable, though some slow migration has been noticed toward the southeast. All wells adjacent to the 241-T-106 tank contain significant levels of radioactive contamination.

Figure 8-2 shows the release plume migration away from the 241-T-106 tank. Also included in the figure is the plume migration of the 241-T-106 tank release (UPR-200-W-147). A description of the 241-T tank farm subsurface geology can be found in ARH (1973).

Table 8-5. Composition of the UPR-200-W-148 Waste Discharged. (BHI 1994)

INORGANICS (molar)		
	Sodium	4.0
	Ammonium	0.065
	Potassium	0.016
	Calcium	0.0022
	Nitrite	1.18
	Carbonate	0.79
	Nitrate	0.77
	Sulphate	0.25
	Hydroxide	0.24
	Aluminum	0.064
	pH	11.9
RADIONUCLIDES (microcuries/gallon)		
	^{144}Ce-^{144}Pr	46,800
	^{137}Cs	335,000
	^{155}Eu	6,400
	^{125}Sb	4,240
	^{89}Sr-^{90}Sr	113,000
	^{106}Ru-^{106}Rh	2,320,000
	^{239}Pu	34.0
	^{240}Pu	8.0
	^{241}Am	6.0

Figure 8-2. Diagram Showing Waste Plume Migration from 241-T-103 and 241-T-106 Tanks.



8.8 241-T-107 TANK

Dry well and liquid level measurements remained stable through 1977, although the tank is an assumed leaker (Stalos and Walker 1977).

8.9 241-T-108 TANK

The 241-T-108 tank was removed from service because of questionable integrity when the liquid level decreased by 0.30 in. In 1978, studies were made with the conclusion that all dry well activity is associated with the 241-T-106 tank leak. In 1979, additional wells were drilled because activity in one of the established dry wells continued to increase. The source of the increase was evaluated with the conclusion that the 241-T-106 tank release was a questionable source of the activity increase. This tank is now thought to be an assumed leaker (Stalos and Walker 1977).

8.10 241-T-109 TANK

This unit was removed from service because of questionable integrity as a result of increasing activity found in dry wells. Since 1976, activity in all dry wells has steadily decreased (Stalos and Walker 1977); although this tank is still considered to be an assumed leaker (Hanlon 1991). Dry wells are the only means of leak detection because the FIC plummet is contacting solids. During the past review period the dry well activity has remained stable (Stalos and Walker 1977).

8.11 241-T-110 TANK

The 241-T-110 tank has the potential for hydrogen or other flammable gas generation (BHI 1994). Because this unit contains solids, dry wells are the only means of leak detection and have remained stable through the mid-1970's (Stalos and Walker 1977).

8.12 241-T-111 TANK

The 241-T-111 tank was categorized as having questionable integrity after an unexplained liquid level decrease of 0.30 in. in 1974. The tank is now classified as an assumed leaker (Hanlon 1991). Dry wells are the only source of leak detection because of the solids contained in the tank (Stalos and Walker 1977).

8.13 241-T-112 TANK

Dry well and liquid level measurements have remained stable during the past review period (Stalos and Walker 1977).

8.14 241-T-151 DIVERSION BOX

The 241-T-151 diversion box is located west of the 241-T-110 tank and directly north of the 241-T-152 diversion box, and is interconnected with the 241-T-110 tank, 241-U-151 diversion box, 221-T canyon building, and the 241-T tank farm (Harmon 1975). The box is 20 ft by 5 ft by 1 ft and has been sprayed with plasticised foam (site visit by authors, October 1991).

8.15 241-T-152 DIVERSION BOX

The 241-T-152 diversion box is located southwest of the 207-T retention basin, just north of 23rd Street and interconnects with the 241-T-153 diversion box, 241-TX-153 diversion box, 241-T-155 diversion box, and the 221-T canyon building (Hanford drawing H-2-34762 R6) (Harmon 1975). The box is located approximately 10 ft north of 241-T-151. The appearance is similar to 241-T-151 and it has also been coated with a protective foam layer.

8.16 241-T-153 DIVERSION BOX

The 241-T-153 diversion box is located east of the 241-T-110 tank and is interconnected with the 241-TX-153 diversion box, 241-T-155 diversion box, and the 221-T canyon building (Hanford drawing H-2-44511, Sheet 134) (Harmon 1975).

8.17 241-T-201 TANK

In June 1980, Occurrence Report 80-53 was issued because the liquid level exceeded the established 2 in. criteria by 0.25 in. The increase was attributed to solid movement in the vicinity of the manual tape pencil plummet. In-tank photographs confirm a liquid level increase had occurred. The increase is attributed to precipitation entering the unit, and the point of liquid infiltration is currently being investigated (Stalos and Walker 1977).

8.18 241-T-202 TANK

Radiation readings in the peripheral dry wells have remained stable during the past review period. In-tank photographs and surface measurements confirm liquid level increases from intrusions during the mid-1970's (Stalos and Walker 1977).

8.19 241-T-203 TANK

Dry well and liquid level surface readings have remained stable during the mid-1970's (Stalos and Walker 1977).

8.20 241-T-204 TANK

Surface level measurements have remained stable during the mid-1970's (Stalos and Walker 1977).

8.21 241-T-252 DIVERSION BOX

The 241-T-252 diversion box is located just north of the 23rd Street and southwest of the 241-T-112 tank, and connects with the 241-T-153 diversion box, 221-T canyon building, and the 241-T tank farm (Hanford drawing H-2-44511, Sheet 134) (Harmon 1975). This diversion box is located near the southern fence of the 241-T tank farm. The box projects approximately 0.5 ft above grade. It has been entirely coated with protective foam (site visit by authors, October 1991).

8.22 241-T-301 CATCH TANK

The 241-T-301 catch tank is inactive and is located slightly east of the 241-T-252 diversion box and south of the 241-T-112 tank. This tank collects overflow from the 241-T-252 and 241-T-151 diversion boxes (Hanford drawing H-2-44511 R4, Sheet 134).

8.23 241-T-302 CATCH TANK

The 241-T-302 catch tank is inactive and is located adjacent to the 241-T-152 diversion box. It is designed to accept any overflow from the diversion box (Hanford drawing H-2-44511, Sheet 134).

8.24 241-TR-152 DIVERSION BOX

The 241-TR-152 diversion box is located just east of the 241-T-104 tank, and interconnects with the 241-T-153 diversion box, 241-TXR-151 diversion box, and the 241-T tank farm (DOE-RL 1987).

8.25 241-TR-153 DIVERSION BOX

The 241-TR-153 diversion box is located just east of the 241-T-107 tank and interconnects with the 241-TR-152 and 241-TXR-151 diversion boxes (DOE-RL 1987).

8.26 UN-200-W-62 UNPLANNED RELEASE

The UN-200-W-62 UPR occurred on May 4, 1966, at the corner of 23rd Street and Camden Avenue (Stenner et al. 1988). Contaminated liquid waste escaped from a ruptured transfer line and contacted ground sediments during the transfer of second-cycle bismuth phosphate waste from the 241-T-107 tank to the 242-T evaporator feed, with readings from 20 to 5,000 mR/h. Liquid ran from the site of the spill and spread over an area approximately 2 yd wide by 40 yd long (Stenner et al. 1988).

8.27 UN-200-W-64 UNPLANNED RELEASE

The UN-200-W-64 UPR is contained in a 50-ft strip of ground along Camden Avenue at 23rd Street (Stenner et al. 1988). Contamination of cesium-137 to 600 c/m in mud samples was found and the

area was cordoned off as a radiation zone. The cause is thought to be snowmelt running off of nearby radiation zones, probably the UN-200-W-29 and UN-200-W-97 UPRs (BHI 1994).

8.28 UN-200-W-97 UNPLANNED RELEASE

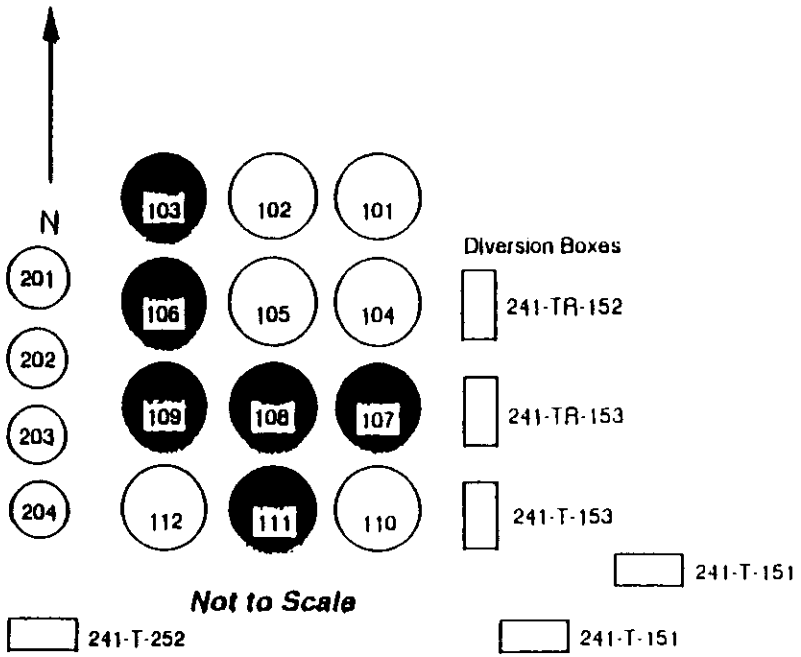
The UN-200-W-97 UPR contaminated an area ranging from the southeast corner of 23rd Street and Camden Avenue, south to near 22nd Street. An earlier UPR (UN-200-W-29) also occurred at this spot (see Section 4.14) (Stenner et al. 1988). A liquid waste solution spilled from a broken underground line on the southeast corner of Camden Avenue, surfaced and ran west across the street, but did not run down the side of the road as it did in UN-200-W-29 UPR. This line was abandoned after UN-200-W-29 occurred in the 1950's (Maxfield 1979).

All surface contamination was removed to a depth of 3 ft and buried in the 200 West Area burial ground. In 1978, contaminated soil adjacent to the zone was removed on the south side to a depth of 4 ft and on the west side to a depth of 3 ft. The area was backfilled with earth and later covered with clean soil (Maxfield 1979).

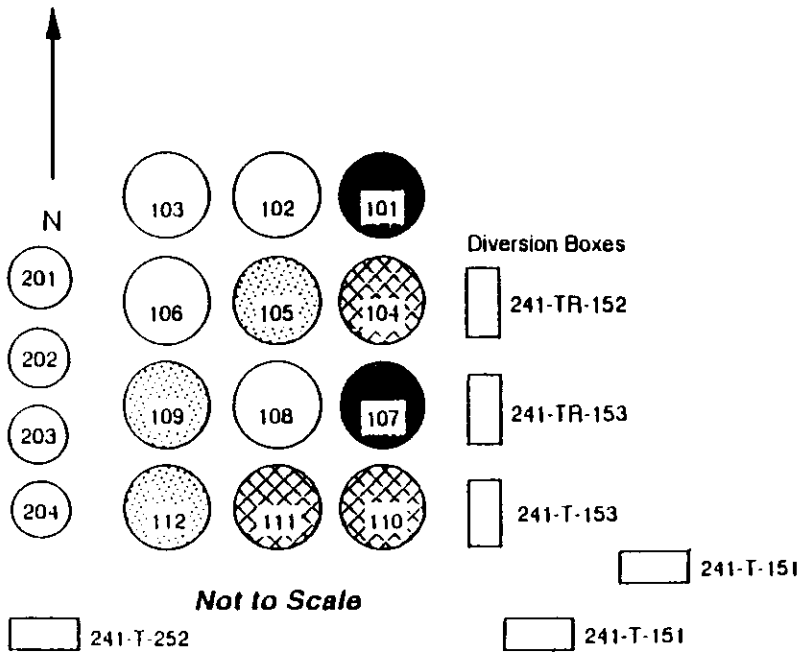
Subsurface contamination of 600 c/m was detected. This is an increase from the previous survey (Huckfeldt 1990).

Just east of the this UPR, there is an area that has a light chain barricade and is posted with surface radiation contamination warning signs (site visit by author, October 1991). This site has received no official designation. Its contamination was discovered during the stabilization of the adjacent UN-200-W-29 and UN-200-W-97 UPRs. There is no known history of the site. Boyd Shannon has scraped the soil off of the site on two occasions and it was moved to the 216-T-26, 216-T-27, and 216-T-28 crib locations before their stabilization. The site is thought to be clean, but has not had a release survey conducted yet (Nelsen, personal communication).

Figure 8-3 depicts the assumed tank integrity and the general quantity of total waste contained in each tank of the T tank farm.



A. Schematic diagram depicting individual tank integrity.



B. Schematic diagram depicting the quantity of total waste by individual tank in the T Tank Farm.

Figure 8-3. T Tank Farm Integrity and Waste Volumes.

9.0 OPERABLE UNIT 200-SS-2

The 200-SS-2 Operable Unit is the smallest operable unit within the T Plant Aggregate Area, in terms of number of sites. There are six sites and four UPRs within this unit that form the southeastern portion of the T Plant Aggregate Area (Figure 9-1).

Most of the sites within this operable unit are active, and some have been active since 1943 (Figure 9-2). None of the sites have been ranked as posing a significant hazard (Tables 9-1 and 9-2) (Stenner et al. 1988). Current site conditions are summarized in Table 9-3.

9.1 216-W-LWC CRIB

The 216-W-LWC crib is an active waste site located about 250 ft southeast of the 2724-W building (Hanford photograph A-28). The site received 1.2 billion L of process wastewater from 2724-W and 2723-W buildings (BHI 1994). The radioisotopes thought to be present are americium-241, cesium-137, tritium, plutonium-239, and strontium-90 (Brown et al. 1990).

There are three distribution lines in the crib that are indicated by regularly spaced polyvinyl chloride risers. There are several vertical culvert-like steel pipes with ladders leading down into them at the west end of the crib (site visit by author, October 1991).

9.2 200-W ASH DISPOSAL BASIN

The 200-W ash disposal basin is an active waste site located northeast of the U Plant area. It is a large, irregularly-shaped excavation. The southeast corner appears to be a borrow area. The other slopes are low angle and are vegetated. Present in the central part of the excavation are railroad ties and other debris. At the northern end, are large bales of dry brush (site visit by author, October 1991).

Two fenced sites are located within the basin. In the northeast section of the basin, there is a 14-ft by 14-ft site with a nylon rope barricade posted with a sign "RCRA Waste Site Do Not Disturb Call R.C.P.Hill 376-7454." There is no apparent indication, other than the sign, that waste is present. This is the area where unstable chemicals were detonated in the past. The site has been inactive for several years (Reidel, personal communication). BHI (1994) shows that the coordinates of the 200-W ash disposal site (not included in the *Hanford Federal Facility Agreement and Consent Order* [Tri-Party Agreement]) (Ecology et al. 1991) correspond to this area. BHI (1994) reports the last disposal was in 1986.

The other fenced area is next to the entrance ramp on the west side of the basin. It is about a 60-ft by 20-ft trench filled with tumbleweeds (site visit by author, October 1991). Contaminated laundry was surreptitiously disposed at this location. Upon discovery, the clothing and soil was removed (Mikulecky, personal communication).

Adjoining the basin on the northwest is the area where ash is present at the surface. There is a cut through this zone that is about 15 ft deep, 150 ft long, 100 ft wide at the mouth, and 30 ft wide at the end (site visit by author, October 1991).

Figure 9-1. Location Map for Operable Unit 200-SS-2.

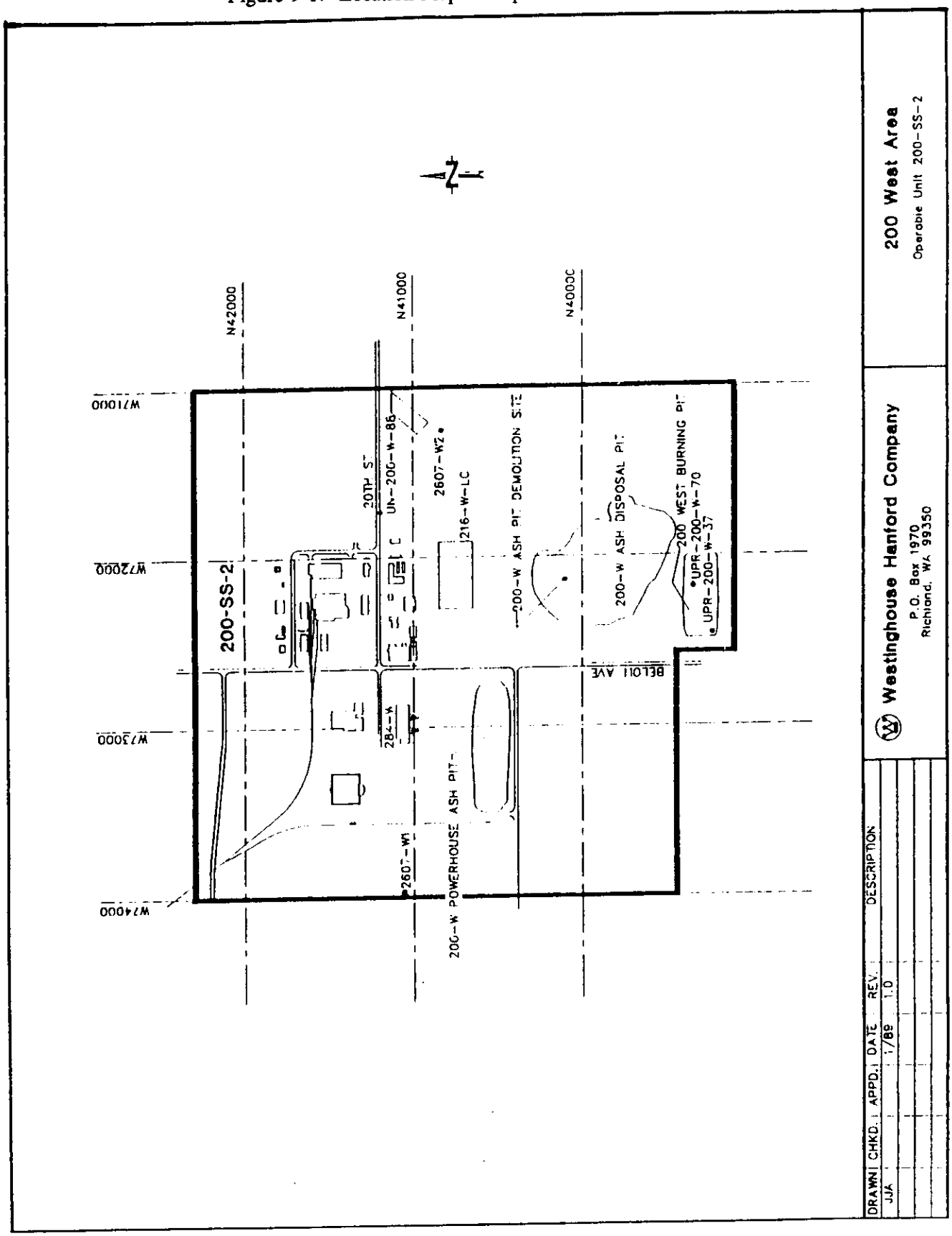


Figure 9-2. Summary of the Operational Periods for Operable Unit 200-SS-2.

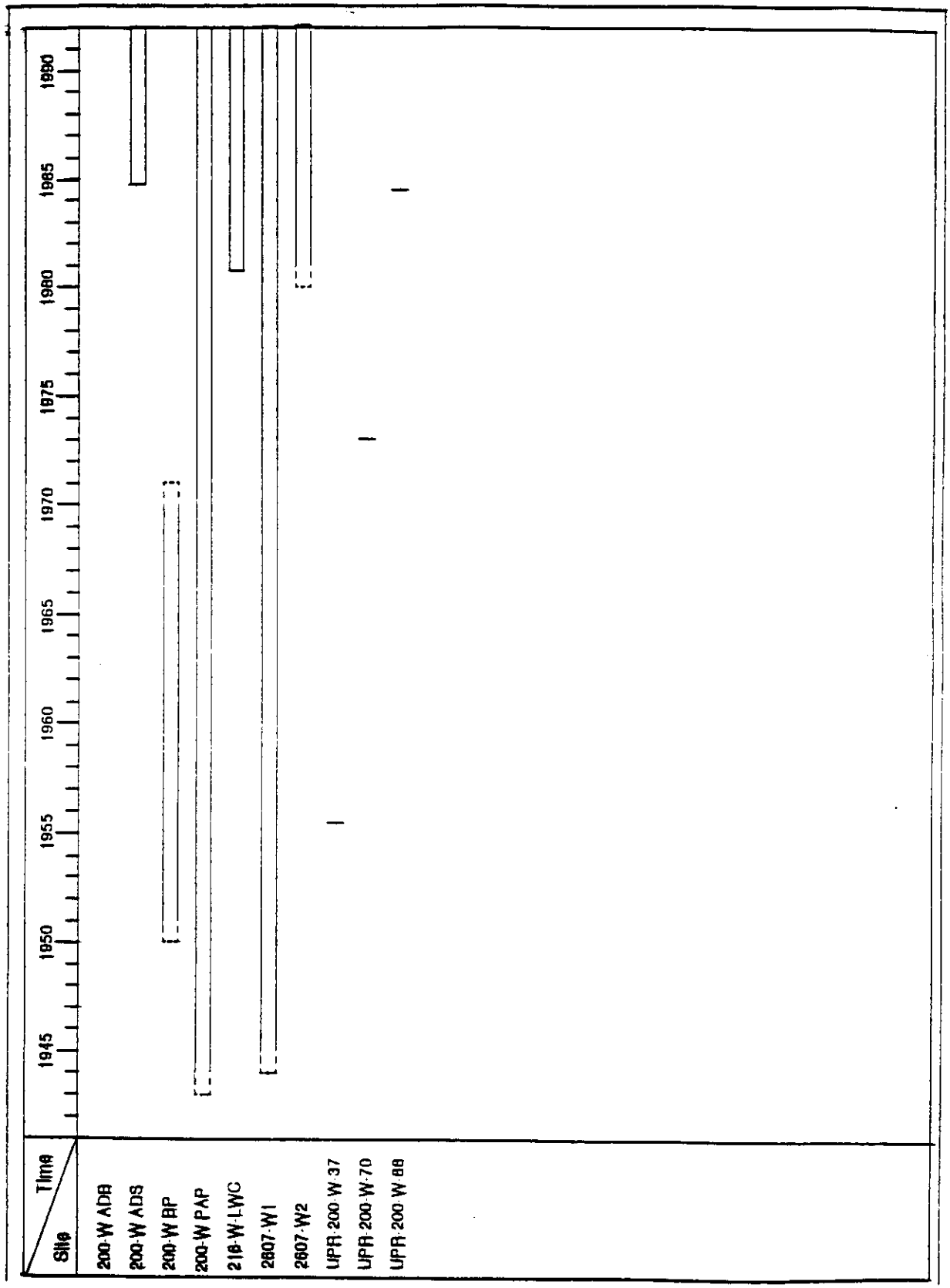


Table 9-1. Site Location and Waste Type Summary Table for Operable Unit 200-SS-2 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
200-W ADB	Ash Pit	Active	N40400 W71900, N40400 W72400, N39400 W72500, N92350 W71700	Low-Level Waste
200-W BP	Burning Pit	Inactive	N39300 W72300	Hazardous Waste
200-W PAP	Powerhouse Ash Pit	Active	N40500 W73800	Nonhazardous/Nonradioactive
216-W-LWC	Crib	Active	N40850 W72304, N40649 W72304, N40850 W71910, N40649 W71910	Low-Level Waste
2607-W1	Septic Tank	Active	N41050 W73950	Nonhazardous/Nonradioactive
2607-W2	Septic Tank	Active	N40850 W71250	Nonhazardous/Nonradioactive
UN-200-W-88	Unplanned Release	Inactive	N41200 W71750	Mixed Waste
UPR-200-W-37	Unplanned Release	Inactive	N39230 W72450	Mixed Waste
UPR-200-W-70	Unplanned Release	Inactive	N39800 W72200	Mixed Waste

Table 9-2. Operational Data and Waste Volumes for Operable Unit 200-SS-2 (BHI 1994).

Site	Type of Site	Status	Coordinates	Type of Waste
200-W ADB	Ash Pit	Active	N40400 W71900, N40400 W72400, N39400 W72500, N92350 W71700	Low-Level Waste
200-W BP	Burning Pit	Inactive	N39300 W72300	Hazardous Waste
200-W PAP	Powerhouse Ash Pit	Active	N40500 W73800	Nonhazardous/Nonradioactive
216-W-LWC	Crib	Active	N40850 W72304, N40649 W72304, N40850 W71910, N40649 W71910	Low-Level Waste
2607-W1	Septic Tank	Active	N41050 W73950	Nonhazardous/Nonradioactive
2607-W2	Septic Tank	Active	N40850 W71250	Nonhazardous/Nonradioactive
UN-200-W-88	Unplanned Release	Inactive	N41200 W71750	Mixed Waste
UPR-200-W-37	Unplanned Release	Inactive	N39230 W72450	Mixed Waste
UPR-200-W-70	Unplanned Release	Inactive	N39800 W72200	Mixed Waste

Table 9-3. Summary of Current Site Conditions for Operable Unit 200-SS-6.

Site	Barrier	Warning Sign	Markers	Stabilization	Height (ft)	Vegetation	Access Restrictions	Surf Con. (sq ft)	Rad. Zone (sq ft)
200-W ABD	None	No Dumping	None	Soil Turned Over	0.0	Native Grass	None	0	0
200-W ADS	None	None	None	None/Unknown	0.0	Brush/Grass	None	0	0
200-W BP	None	None	None	Partial Ground Cover	0.0	Brush/Grass	None	0	0
200-W PAP	Light Chain	Open Pit	None	None/Unknown	0.0	None	None	0	0
200-W-PP	None	None	None	None/Unknown	0.0	!	None	0	0
216-W-LWC	Light Chain	Underground Contamination	Concrete Post w/ Plaque	Soil cover/Backfill	0.5	Brush/Grass	None	0	0
2607-W1	Light Chain	None	Metal Post with Plaque	None/Unknown	0.0	Brush/Grass	None	0	0
2607-W2	Light Chain	None	Metal Post with Plaque	None/Unknown	0.0	Brush/Grass	None	0	0

9.3 200-W POWERHOUSE ASH PIT

The 200-W powerhouse ash pit is located just south of the coal storage yard. This unit receives powerhouse ash that has been tested for extraction procedure toxicity constituents and found to be clean. The ash is generated at the rate of about 8,890 yd^3/yr. The site currently contains about 57,290 yd^3 of ash (Stenner et al. 1988). The pit is about 200 ft by 100 ft by 25 ft with steep slopes. The eastern slope has been stabilized with cobbles. Ash and a film of water covered the bottom of the pit during the site visit. A 6-in. steel pipe was observed discharging about 2 gal/min of water into the pit at the northeastern corner. Ash and sediment are heaped around the ponded water, possibly indicating higher discharges in the past. There are access ramps in the northwest and northeast corners (site visit by author, October 1991).

9.4 200-W BURNING PIT/UN-200-W-8, UPR-200-W-37 AND UPR-200-W-70

The 200-W burning pit is located on the southwest corner of the ash disposal basin, east of U Plant. This unit received nonradioactive construction and office waste, chemical solvents, and paint waste to be burned. This unit has three known UPRs associated with it: UPR-200-W-37, UPR-200-W-8, and UPR-200-W-70 (Stenner et al. 1988).

The UPR-200-W-37 consisted of the disposal of three broken boxes that contained dry high-level radioactive waste with readings of 100 mR/h that contaminated the ground in the pit. The site was cleaned by removing the cartons to the proper burial trench and decontaminating the pit (Stenner et al. 1988).

The UPR-200-W-70 (like UPR-200-W-37) consisted of contaminated material in a nonradiation burning pit. Beta/gamma contamination of 5,000 to 50,000 c/m was found along the bumper rails at the edge of the pit. Contamination to 20,000 c/m to 30 mR/h was discovered in the pit bottom itself. A dump area on the south side of the pit was found to have 5,000 to 200,000 dis/m alpha contamination. The area was barricaded and radiation signs posted. To stabilize the contamination, fabro-film was sprayed on the affected areas (BHI 1994).

The UN-200-W-8 UPR is of an unknown source. The release is indicated to have occurred in 1950. It consisted of spotty contamination with measurements up to 1 Ci. The area was covered with 10 ft of soil and removed from radiation zone status in 1972 (BHI 1994). BHI (1994) locates this site by coordinates in Operable Unit 200-TP-4, but its text describes it as being in the old burning ground, east of the 221-U building.

Currently, there are no barricades or radiation warning signs in the area of the burning ground. The southwest portion of the pit has been backfilled with a coarse gravel and its surface has a gentle slope (site visit by author, October 1991).

9.5 2607-W1 SEPTIC TANK

The active 2607-W1 septic tank and drain field are located southeast of the 241-TX tank farm. The drain field is about 100 ft by 75 ft by 6 ft. This septic system accepted sanitary wastewater and sewage at the estimated rate of 18.3 m^3/d (DOE-RL 1987). The septic tank structure is comprised of a concrete pad with two manholes 5 ft apart on the west side and one manhole on the east side,

approximately 15 ft from the other two. The drain field is about 50 ft southeast of the septic tank, across Bridgeport Avenue (site visit by author, September 1991).

9.6 2607-W2 SEPTIC TANK

The active 2607-W2 septic tank and drain field are located southwest of the main 200 West Area guard gate. This septic system accepts wastewater and sewage at the estimated rate of 10.2 m^3/d (DOE-RL 1987). It has a concrete pad with three square iron plates covering holes. The plates have rusted through, showing liquid below. The drain field is 60 ft by 30 ft by 8 ft and is located about 30 ft southwest of the septic tank (site visit by author, September 1991).

9.7 UN-200-W-88 UNPLANNED RELEASE

The UN-200-W-88 UPR occurred when contaminated liquid spilled on the road from a uranyl nitrate trailer located inside the main gate of the 200 West Area. The contamination consisted of an unknown beta/gamma radiation source with readings from 300 to 650 c/m. All detectable contamination was removed by chipping the asphalt and repaving it (DOE-RL 1987). There is some discrepancy about the location of the spill in BHI (1994), the coordinates do not match the written description of the location. The coordinates do match the location given by Health Physics personnel (Mikulecky, personal communication).

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Nelson, M. A., 1980, *Estimated Volume of Contaminated Soil in TRU/LLW Sites at Hanford*, Rockwell Hanford Operations, RHO-CD-827, Richland, Washington.

Radiological Sciences Department, 1954a, *Radiological Sciences Department Investigation Radiation Incident, Class I, no. 354, 19 April 1954*, HW-31594, General Electric, Richland, Washington.

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Shannon, Boyd, 1991, personal communication, 8 October 1991, restoration/remediation manager.

Short, M. L., 1954, *Manufacturing Department, Radiation Incident Report, 15 November 1954*, HW-33979, General Electric, Richland, Washington.

Smith, R. M., 1980, *216-B-5 Reverse Well Characterization Study*, RHO-ST-37, Rockwell Hanford Operations, Richland, Washington.

Stalos, S. and C. M. Walker, 1977, *Waste Storage Tank Status and Leak Detection Criteria*, 4 volumes, RHO-CD-213, Rockwell Hanford Operations, Richland, Washington.

Stenner, R. D., K. H. Cramer, K. A. Higley, S. J. Jette, D. A. Lamar, T. J. McLaughlin, D. R. Sherwood, N. C. Van Houten, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford*, PNL-6456, Pacific Northwest Laboratory, Richland, Washington.

Welsch, T., 1991, personal communication, October 1991.

Table 10-1 provides a list of key documents used in preparing this report.

Table 10-1. Key References Containing Supporting Data. (sheet 1 of 4)

Aldrich, R. C., 1985, *Radioactive Liquid Wastes Discharged to Ground in the 200 Area During 1984*: RHO-HS-SR-84-3 4Q Liq P. This report discusses radioactive discharges to the ground in the 200 Areas. There are tables of amounts of radioactive liquid put into sites, and totals of specific radioactive constituents. The report is issued quarterly.

Ayster, K. A., 1990, *T Plant Wastewater Stream-Specific Report*: WHC-EP-0342, Addendum 10. This report discusses the proposed "Dangerous Waste" designation for the T Plant waste stream and discusses why it is not a "Dangerous Waste Stream," using a combination of sampling data, process knowledge, and regulatory analyses.

Baldridge, K. F., 1959, *Unconfined Underground Radioactive Waste and Contamination in the 200 Areas-1959*: HW-60807. This report describes all waste sites and UPR locations, however the current numbering system was not used, and the only way to track these is by date and location. All of this information has been entered into BHI (1994).

Beard, S. J., and Godfrey W. L., 1967, *Waste Disposal Into the Ground at Hanford*: ISO-SA-31. Document discusses 1967 waste disposal practices at Hanford, as well as the types of waste streams disposed of at general waste disposal facilities.

Bliss, R. J., October 15, 1990, letter 9057173 subject; Hanford Waste Tanks, to R. E. Gerton, DOE-RL. The letter lists the tanks at Hanford that have the potential for an uncontrolled chemical reaction, and as such are of some concern.

Brown, D. J., 1960, *Geology Underlying 200-Area Tank Farms*: HW-67729. The document has information on the subsurface formations contained under the tank farms.

Brown, D. J., 1971, *Radionuclide Distribution in 200 Area Sediments*: ARH-2213. The report attempts to provide an accurate inventory of the radionuclides deposited in the 200 Area sediments.

Curren, E. F., 1972, *200 Areas Disposal Sites for Radioactive Liquid Wastes*: ARH-947. This report has information in tables on each disposal site area. These tables include unit number, drawing number, type of wastes disposed, service dates, and status.

Delaney, C. D., *Geology and Hydrology of the Hanford Site: A standardized text For Use in Westinghouse Hanford Company Documents and Reports*: WHC-SD-ER-TI-0003. As suggested by the title, this report gives extensive information on the geology and hydrology of the Hanford Site.

DOE/RL-91-03, *Annual Report for RCRA Ground-Water Monitoring Projects at Hanford Site Facilities For 1990*. This is an excellent report summarizing groundwater monitoring at the Hanford Site.

Table 10-1. Key References Containing Supporting Data. (sheet 2 of 4)

Environmental Protection Files (unpublished), various dates and authors, stored at the Environmental Protection building in the 200 West Area. These files contain extensive information on UPRs and remedial action taken (if any) at the time of the release. These files can only be accessed in person and there is very limited help available for file searches.

Fecht, K. R., G. V. Last, and K. R. Price, 1977, *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*: ARH-ST-156 or UC-70, 3 volumes. This reports presents the detailed results of extensive scintillation surveys performed in 1967. Individual plots of logging runs and detailed well location maps, including boundaries of disposal sites, are included. The purpose of these surveys is to quantify the distribution, redistribution, and decay of radionuclides beneath crib facilities in the 200 Area.

Health Physics Scheduled and Supplemental Radiation Survey Forms (unpublished), 1990, stored at Health Physics building in the 200 West Area. These files contain extensive radiological data for annual, periodic, and special request surveys. Additional surveys of site-specific areas can be performed on short notice based on an informal request.

Held, K. R., 1956, *Unconfined Underground Radioactive Waste and Contamination in the 200 Areas*: HW-41535. This report has paragraph descriptions of waste sites and their status as of 1956. All of this information has been placed in BHI (1994).

Historical Unplanned Release File, Draft, 1986, Rockwell Hanford Operations. This report has one page summary reports on all past releases, however these releases do not have the current BHI (1994) numbering scheme, and as such can only be referenced by date and incident location. However most of this information has been placed in BHI (1994).

HW-33305, *Radioactive Liquid Waste Disposal Facilities*, 1954. This document is a compilation of two other documents; HW-27227 and HW-28471. The report has tables composed of site name, structure, coordinates, elevation, waste source, and drawing references. All of this information has been placed in BHI (1994).

Jungfleisch, F. M., 1983, *Supplemental Information for Preliminary Evaluation of the Waste Inventory in Hanford Tanks through 1980*: SD-WM-TI-058 RO. This is a tabulation of the radioactive waste material in the tank farms by isotope with quantities listed in moles and activities in curies.

Lundgren, L. L., 1971, *Radioactive Liquid Waste Disposal Facilities 200 West Area*: ARH-2155. Report lists disposal sites, their waste sources, descriptions, functions, service dates, and status. All of this information has been compiled into BHI (1994).

Table 10-1. Key References Containing Supporting Data. (sheet 3 of 4)

McCullugh, R. W., and J. R. Cartmell, 1968, *Chronological Records of Significant Events in Separations Operations*: ARH-780. This report has summary paragraphs of UPR sites in the 200 Areas. All of this information has been complied into BHI (1994).

Meinhardt, C. C., and J. C. Frostenson, 1979, *Current Status of 200 Area Ponds*: RHO-CD-798. This document discusses active (as of 1979) ditches, ponds, and retention basins used for the disposal of low-level waste, and their potential in keeping radiation from migrating.

Morton, R. L., 1980, *Current Status of Outdoor Radiation Areas in the 200 Areas*: RHO-CD-1048. This document presents tables of waste sites, their radiation contamination estimates and current zone posting.

Nelson, M. A., 1980, *Estimated Volume of Contaminated Soil in TRU/LLW Sites at Hanford*: RHO-CD-827. This report has complete descriptions/definitions of waste sites; such as cribs, trenches, etc. The back of the document has computer printouts of waste volumes sent to soil, and the amount of plutonium discharged in kgs and percent.

Open File Report 75-625, *Geology and Hydrology of Radioactive Solid-Waste Burial Grounds at the Hanford Reservation, Washington*. This document investigates the geology via the use of geologic cross sections and hydrology of the actual waste sites, using existing data. Much of this data is also contained in later geologic reports.

PNL-7346, *Hanford Site environmental report for calendar year 1989*. This report presents a good overview of the environmental monitoring programs at Hanford and includes summaries of soil, water, air, flora and fauna monitoring data.

Retired Facilities Quarterly Inspection Report Second Quarter FY1982, 1982, Radiological Engineering. The report discusses the results of the second quarter review of the investigated facilities. These facilities are found in both the 200 East and West Areas. There are complete schematics of each waste site included in the report.

RHO-LD-42, *Long-Term Management of Low-Level Waste Technology Development Program Plan, 1978*. This report discusses the technology development phase of the Long-Term Low-Level Waste Program.

Rodenhizer, D. G., 1987, *Hanford Waste Tank Sluicing History*: SD-WM-TI-302. This document consolidates all current information on past Hanford Site retrieval operations for the SSTs so that it can be applied to the double shell tanks.

Table 10-1. Key References Containing Supporting Data. (sheet 4 of 4)

Serkowski, J. A., A. G. Law, J. J. Ammerman, and A. L. Schatz, 1988, *Results of Ground-Water Monitoring for Radionuclides in the Separations Area-1987.* This report discusses active waste sites in the 200 Areas and the waste streams discharged to them. There are tables listing radiation concentrations in ground-water near selected waste sites.

Stenner, R. D., K. H. Cramer, K. A. Higley, S. J. Jette, D. A. Lamar, T. J. McLaughlin, D. R. Sherwood, and N. C. Van Houten, 1988, *Hazard Ranking Evaluation of CERCLA Inactive Waste Sites at Hanford*: PNL-6456 Volume 1. This report discusses Hanford Site geology, meteorology, and hydrology. Native biota, population and air quality are also touched upon. This document is one of the main BHI (1994) reference documents.

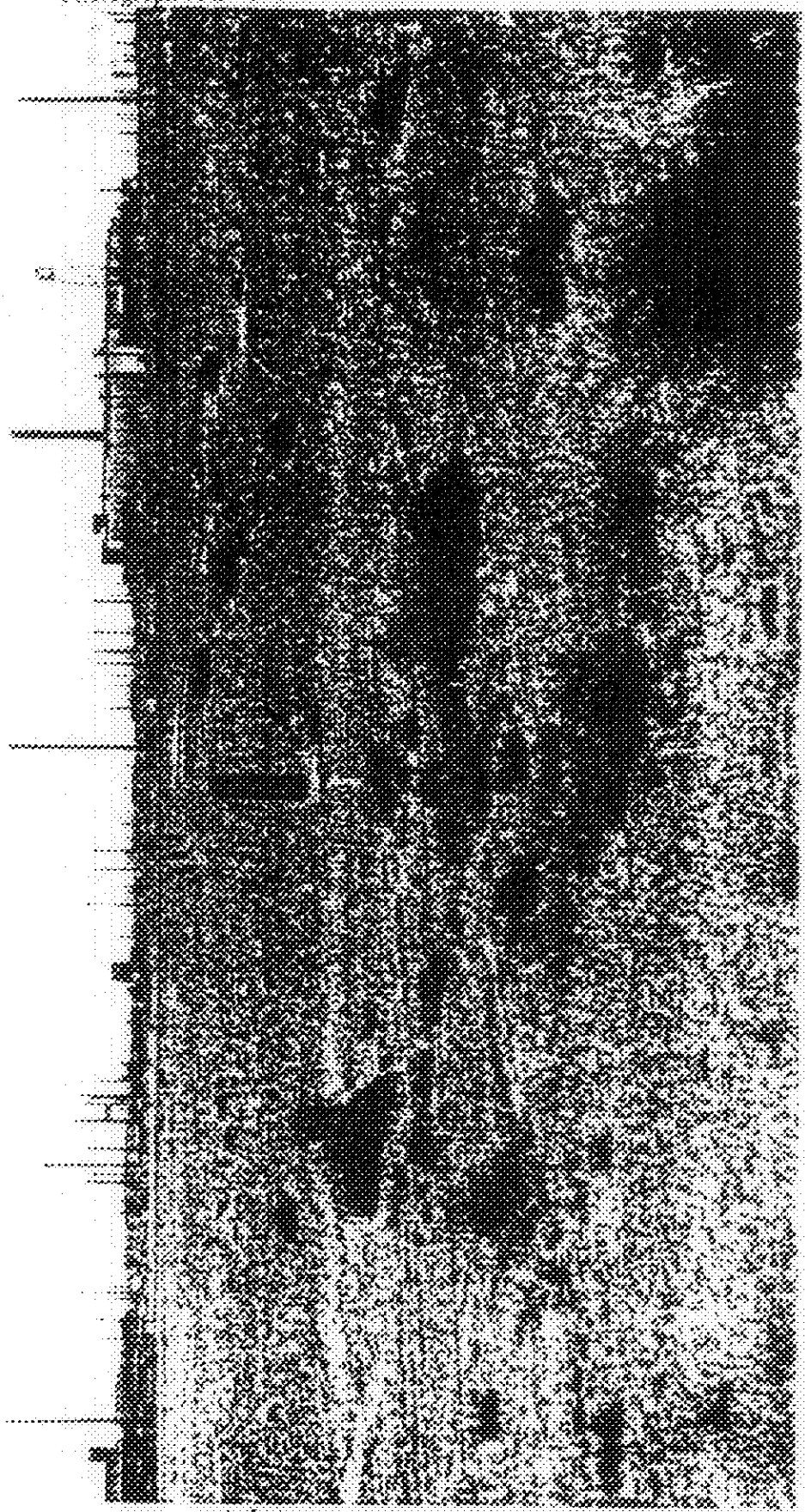
WIDS Database Field Definitions, BHI (1994). The WIDS database is an extensive database that contains specific data on almost all sites and UPRs for each operable unit at Hanford. Data include site dimensions, aliases, waste type, quantity of waste, waste composition. In addition, WIDS may contain information on environmental monitoring and other historical information. The database has undergone extensive quality assurance/quality control (QA/QC) and was developed from at least two preceding databases. As a result of QA/QC questionable data and nonpublished data has been excluded and there are some other limitations to the quantity of data included in the database. All pertinent data from WIDS pertaining to the S Plant operable units is incorporated in this report.

APPENDIX A

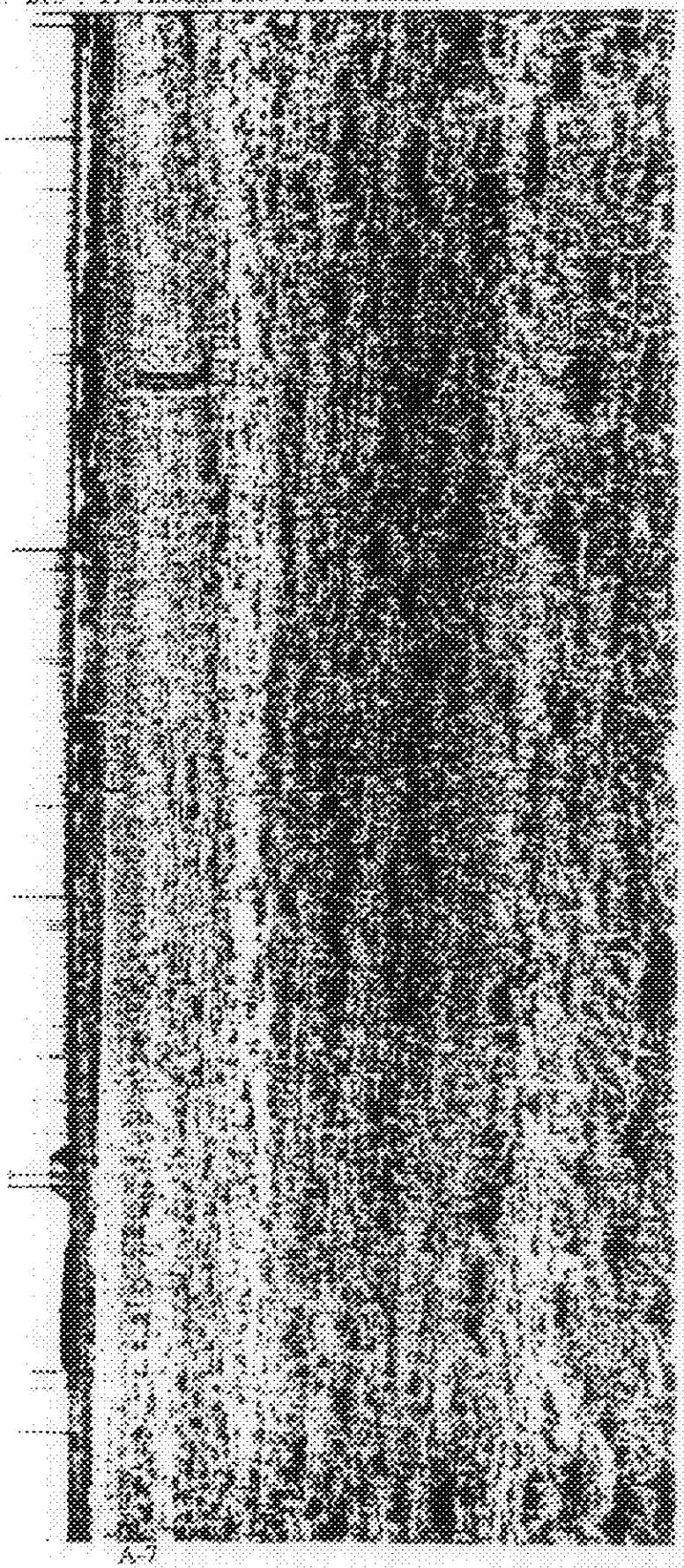
PHOTOGRAPHS

Photograph A-1. 200 West Borrow Area.

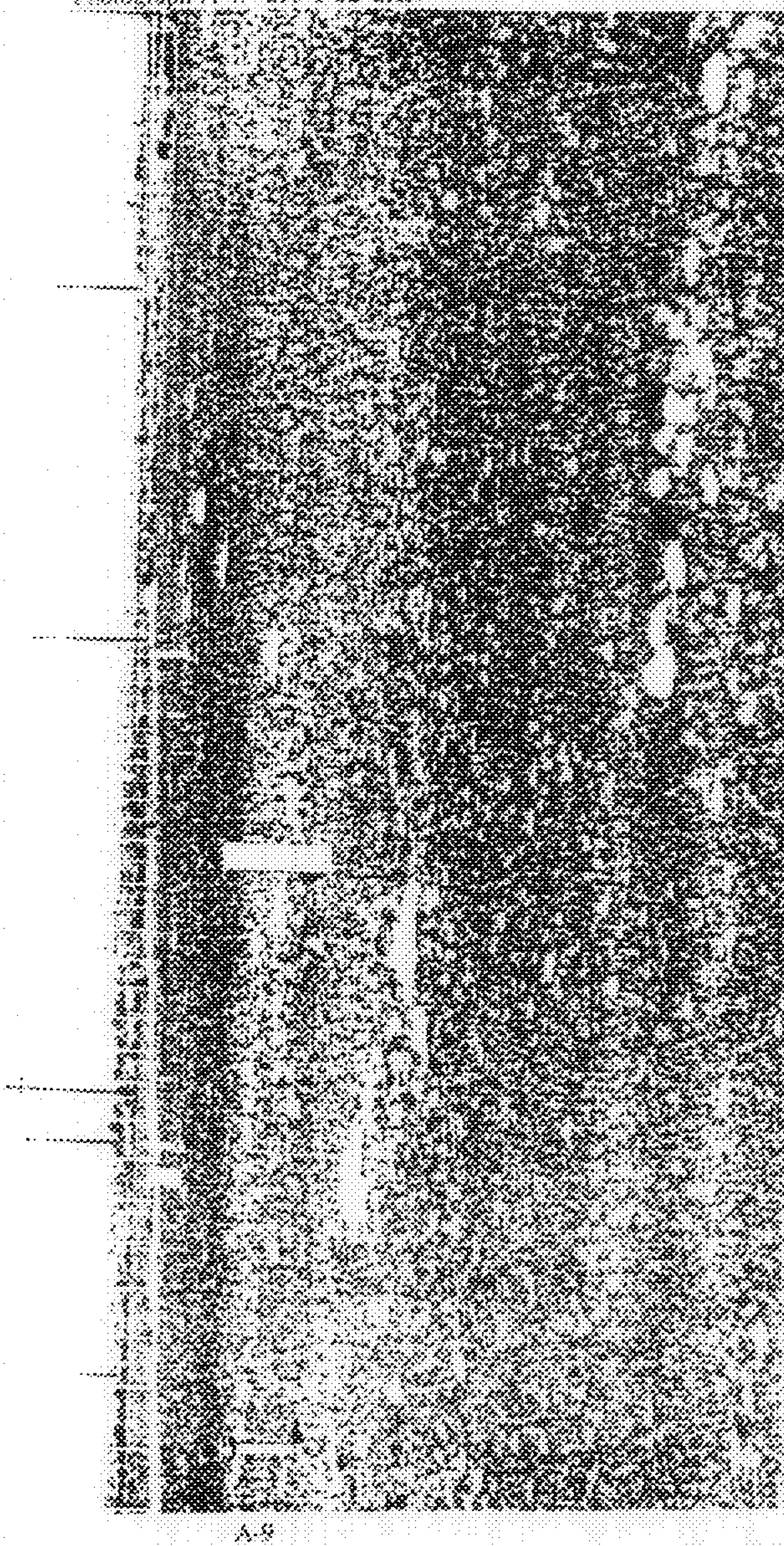
Photograph A-2. 216-T-5 Trench.



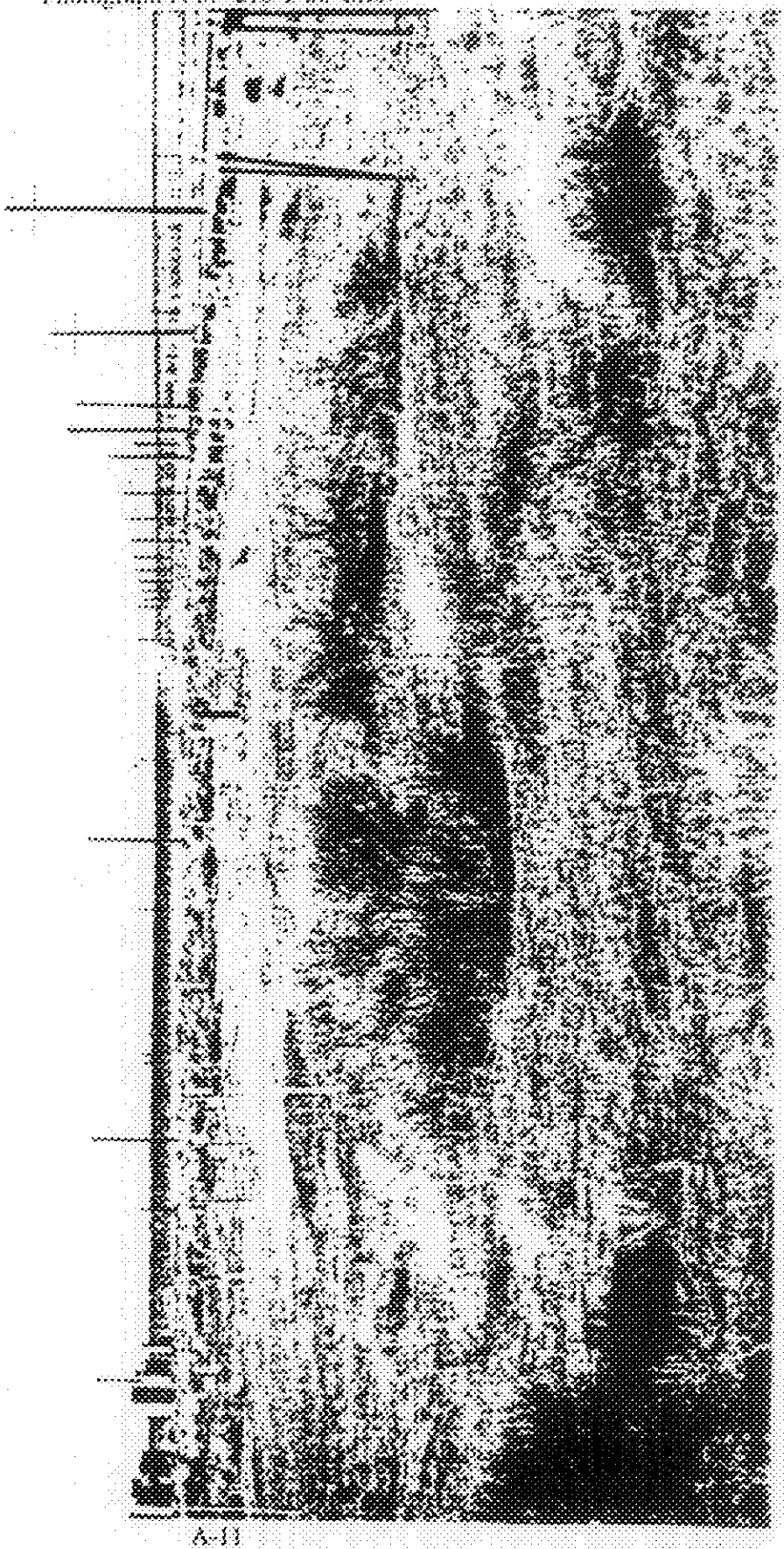
Photograph A-3. 216-T-21 Through 216-T-35 Trenches.



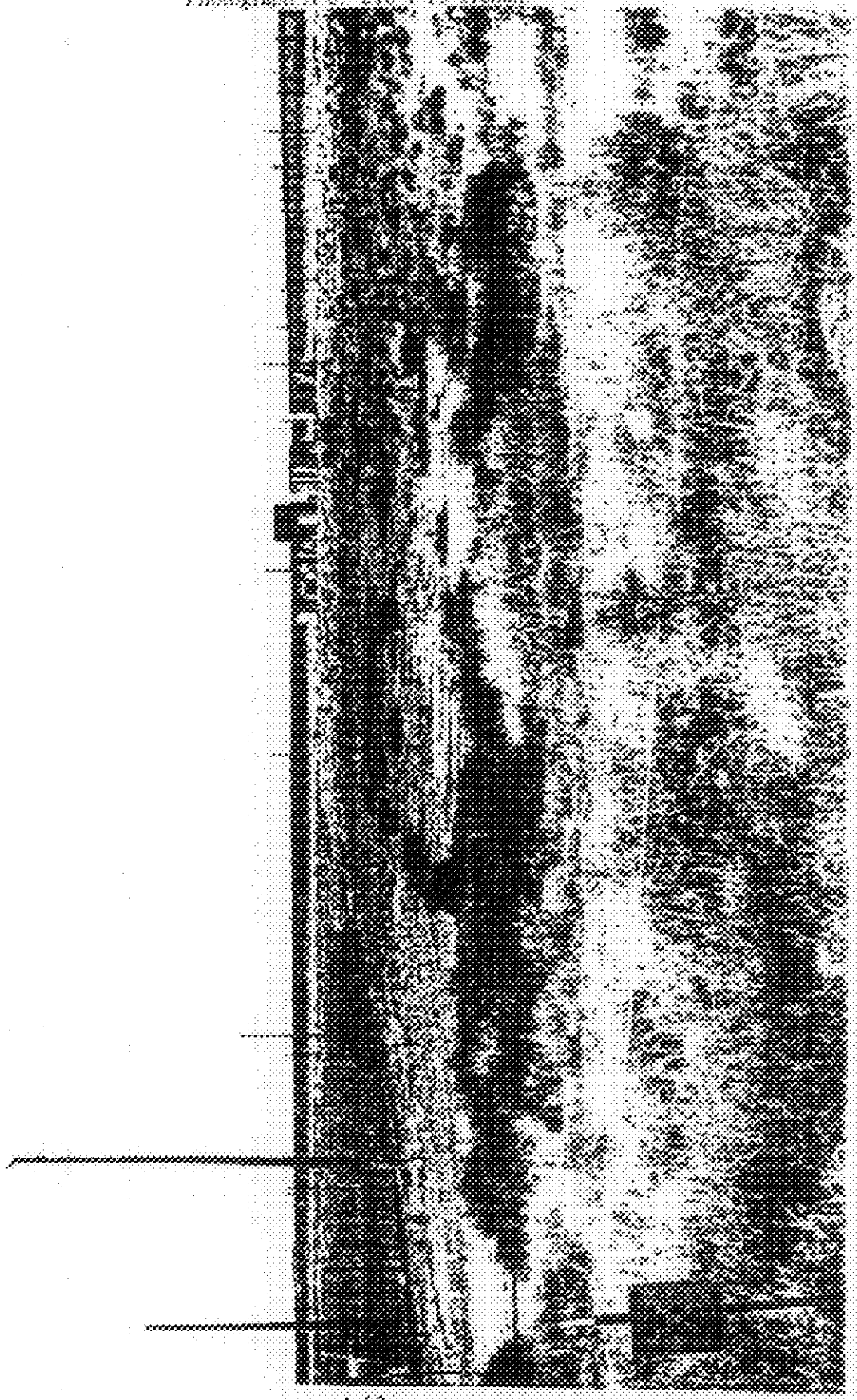
Photograph A-4. 216-T-32 Crib.



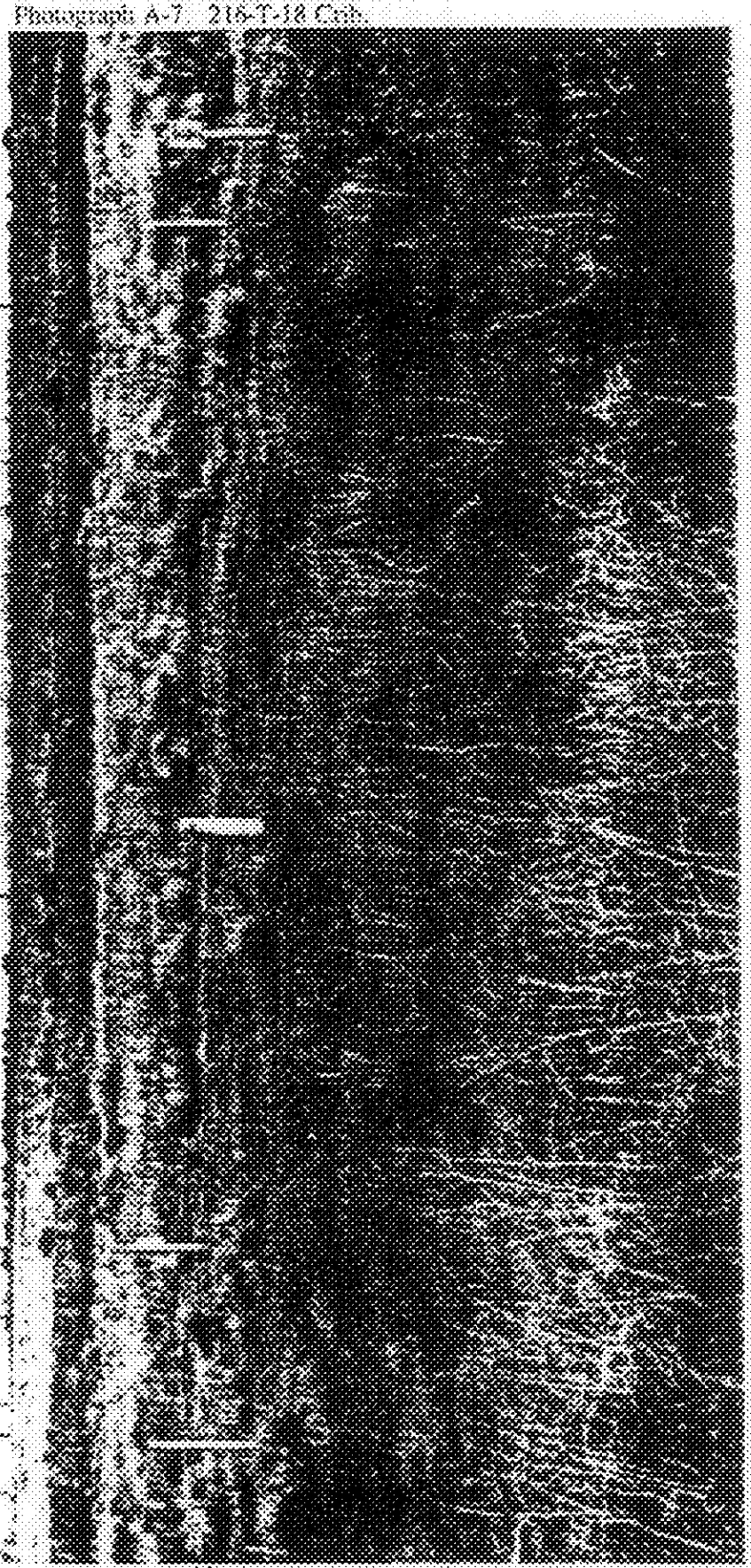
Photograph A-5. 216-T-36 Crib



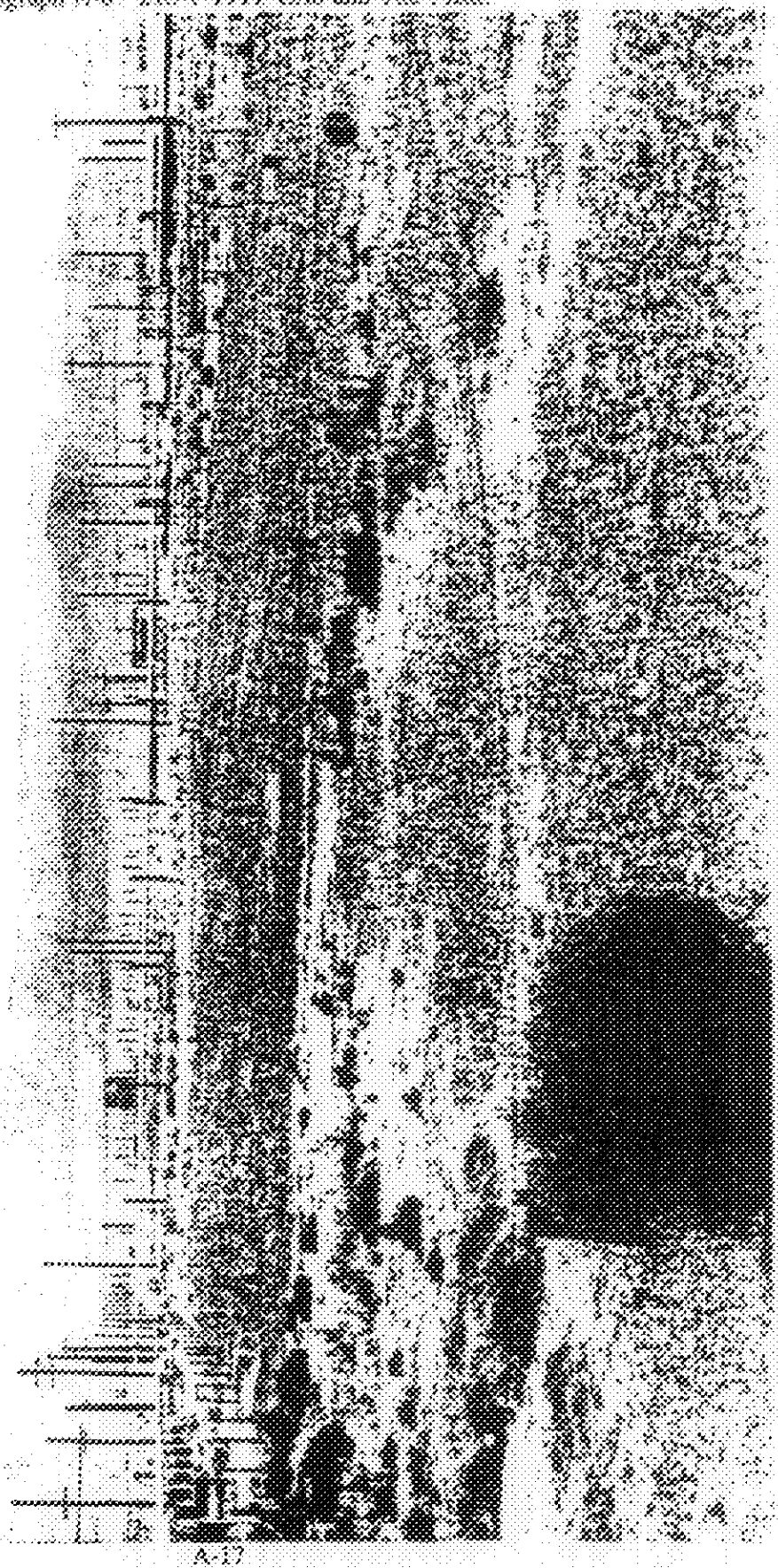
Photograph A-6. 216-T-13 Trench



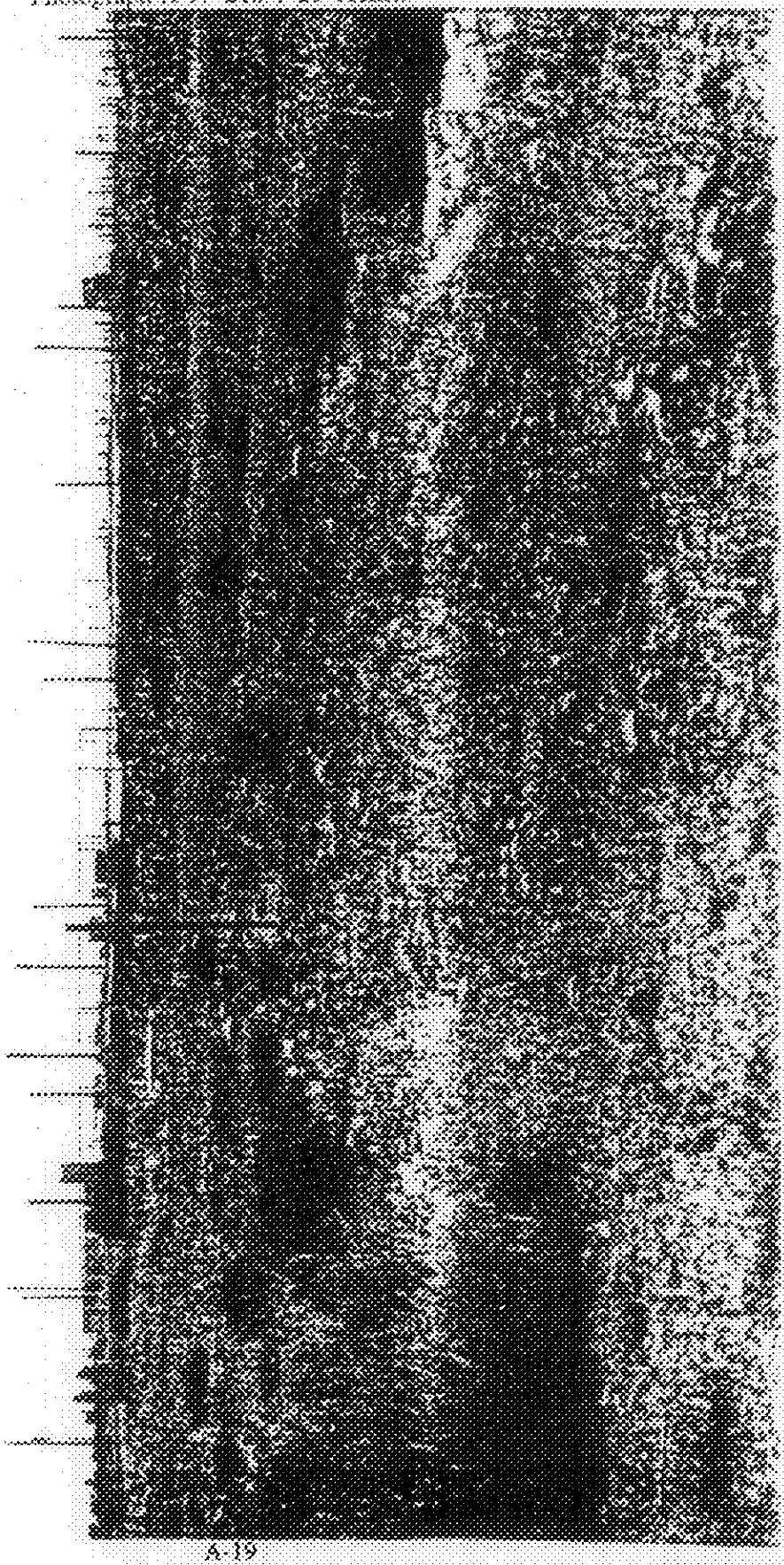
Photograph A-7 216-T-18 Crib



Photograph A-8 216-T-19TP Crib and Tile Field.



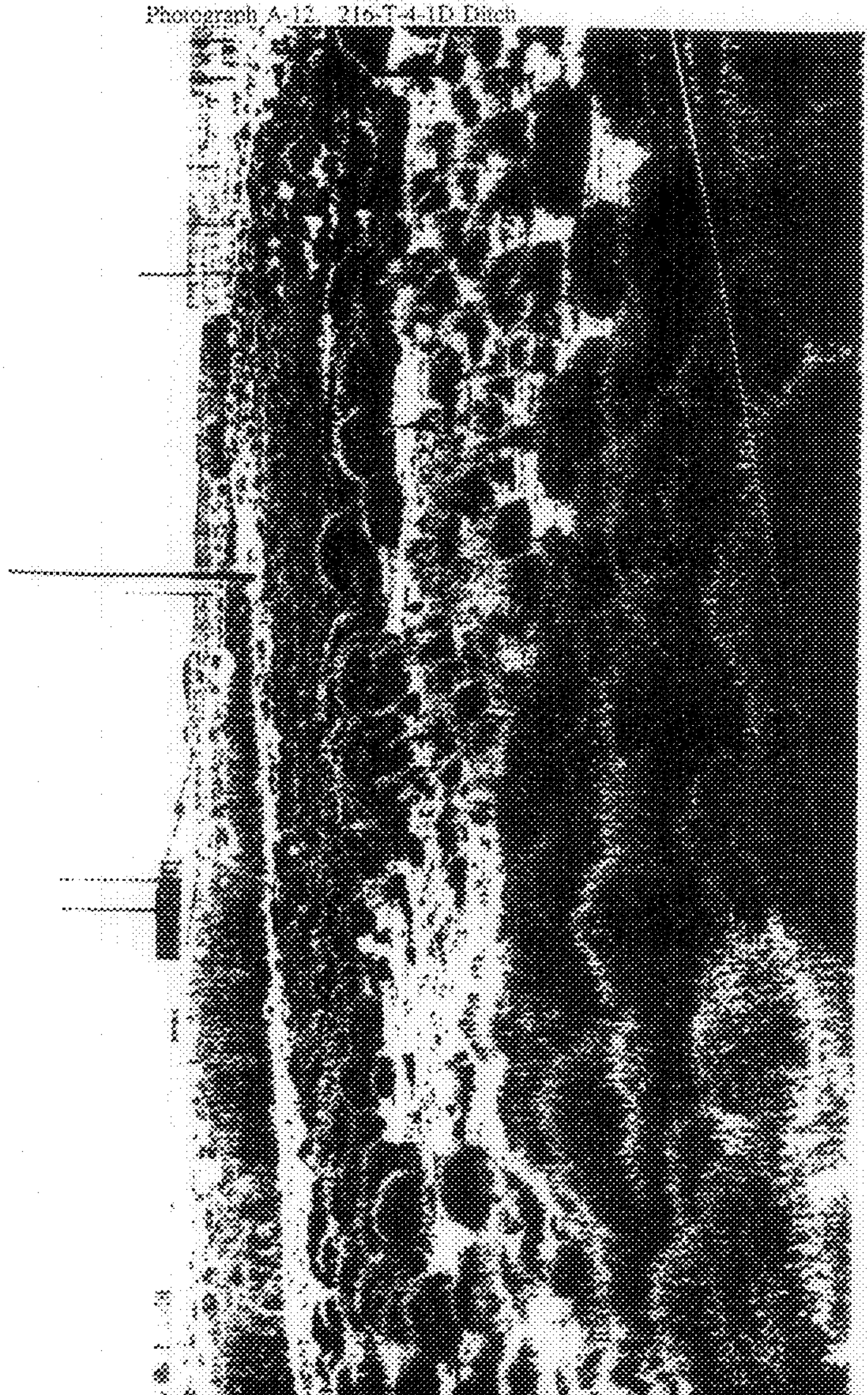
Photograph A-9. 216-T-20 Trench



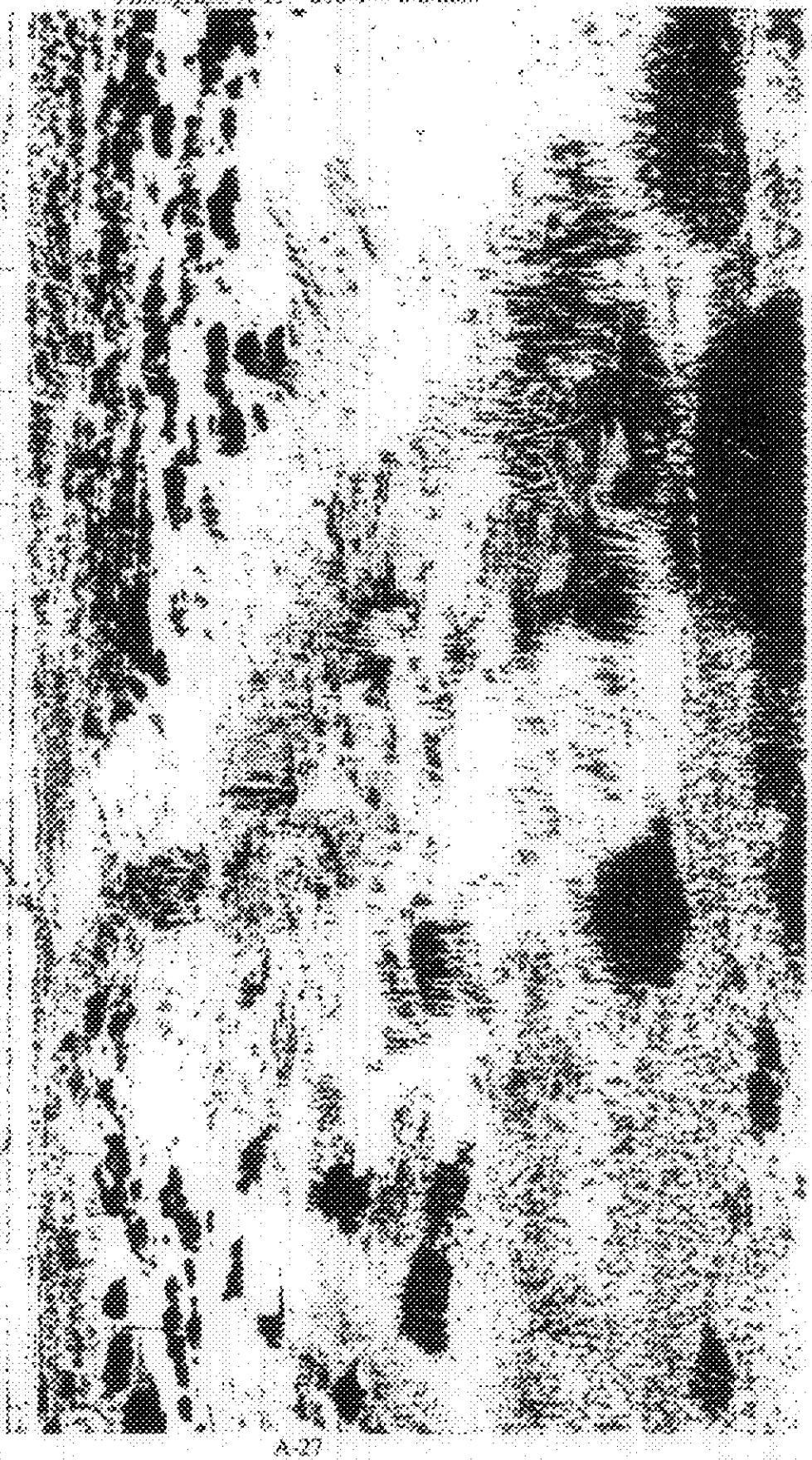
Photograph A-10. Aerial Photograph of T Plant

Photograph A-11. 216-T-26 Crib

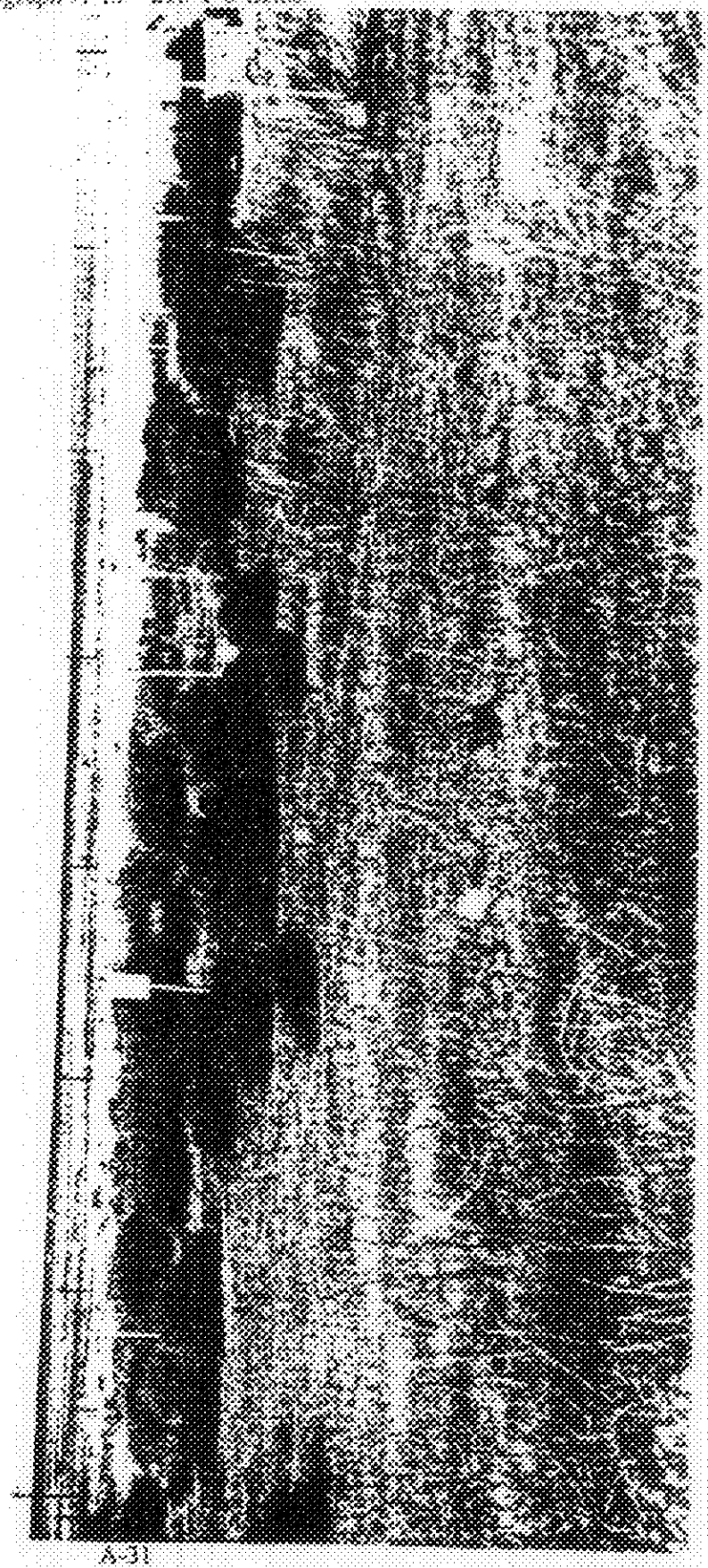
Photograph A-12. 216-T-4-1D Ditch



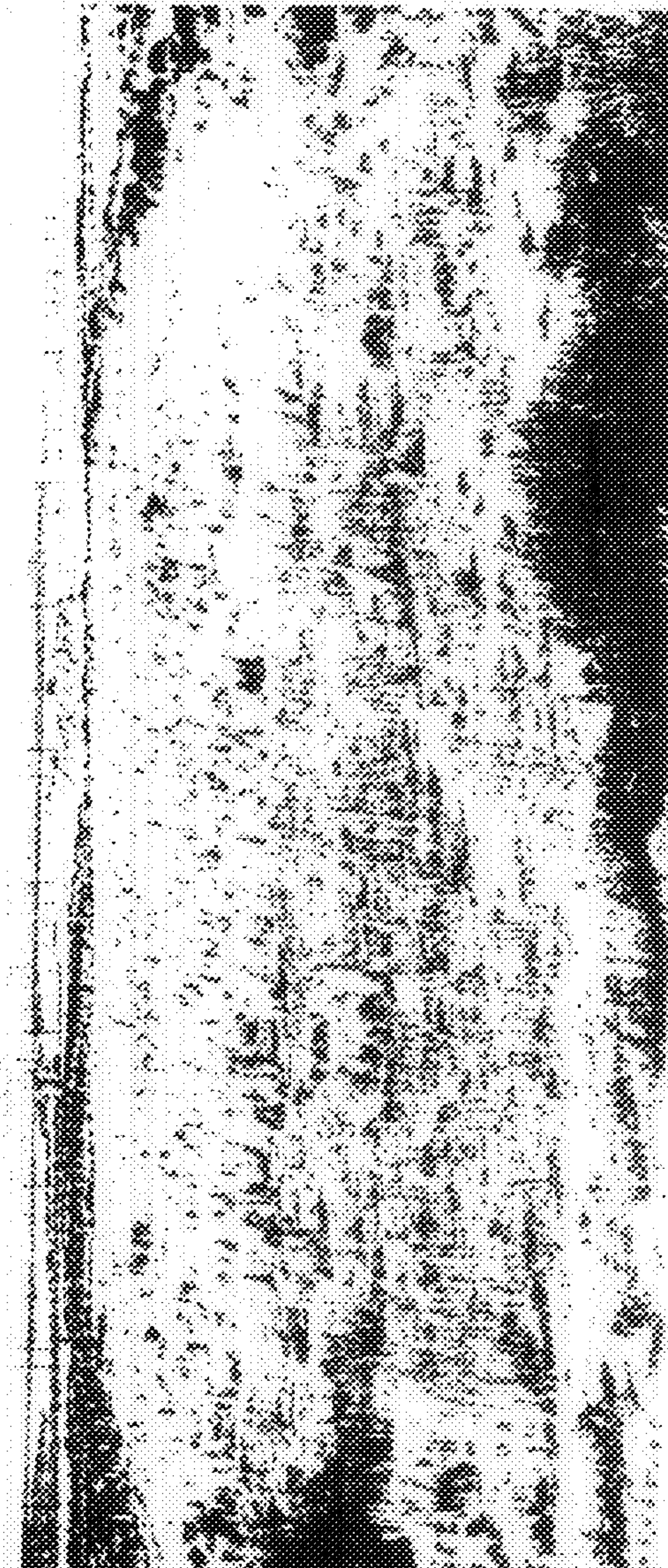
Photograph A-13. 216-T-4-2 Ditch.



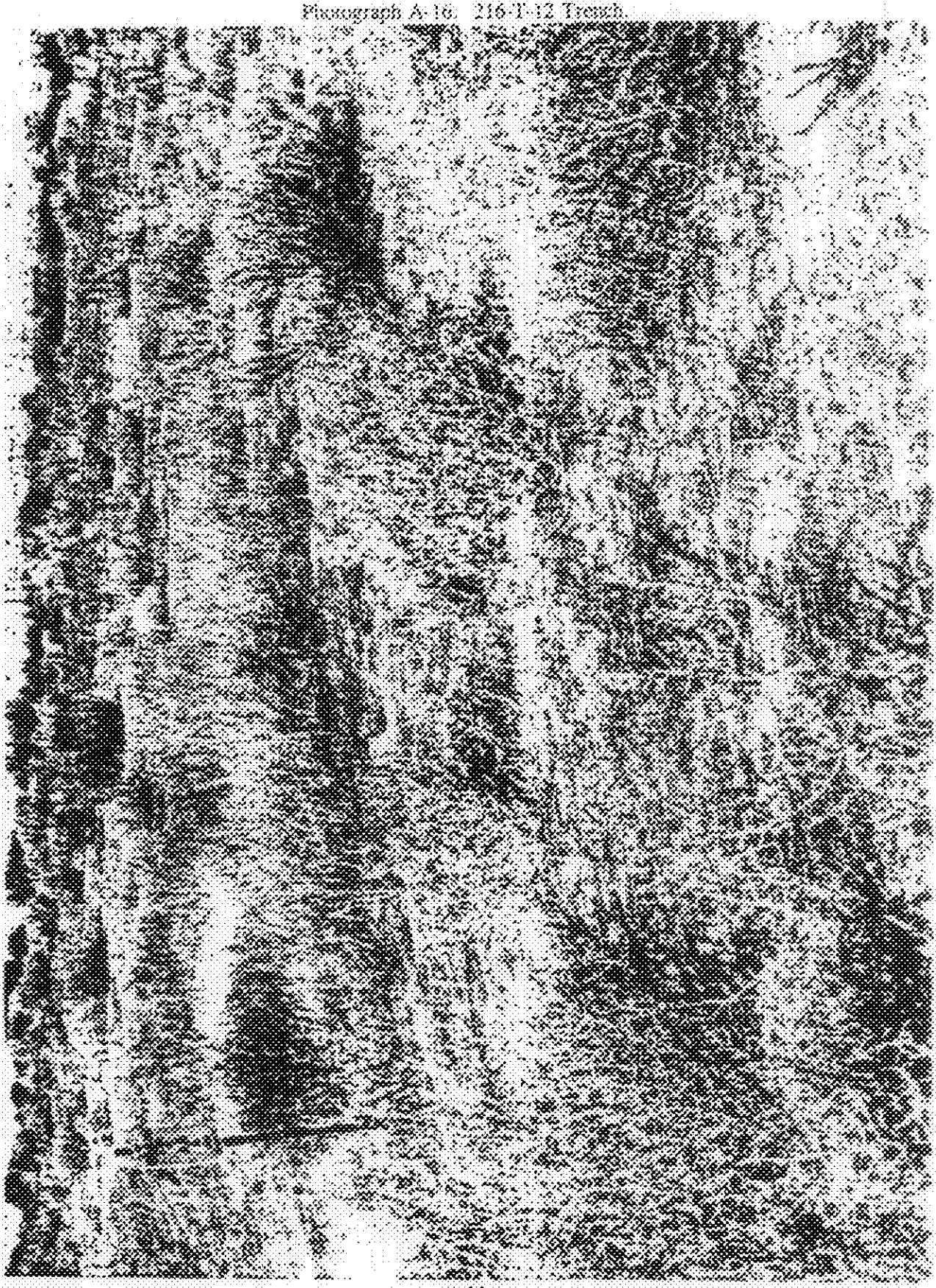
Photograph A-15 216-T-6 Cribs



Photograph A-14. 216-T-4A Pond.



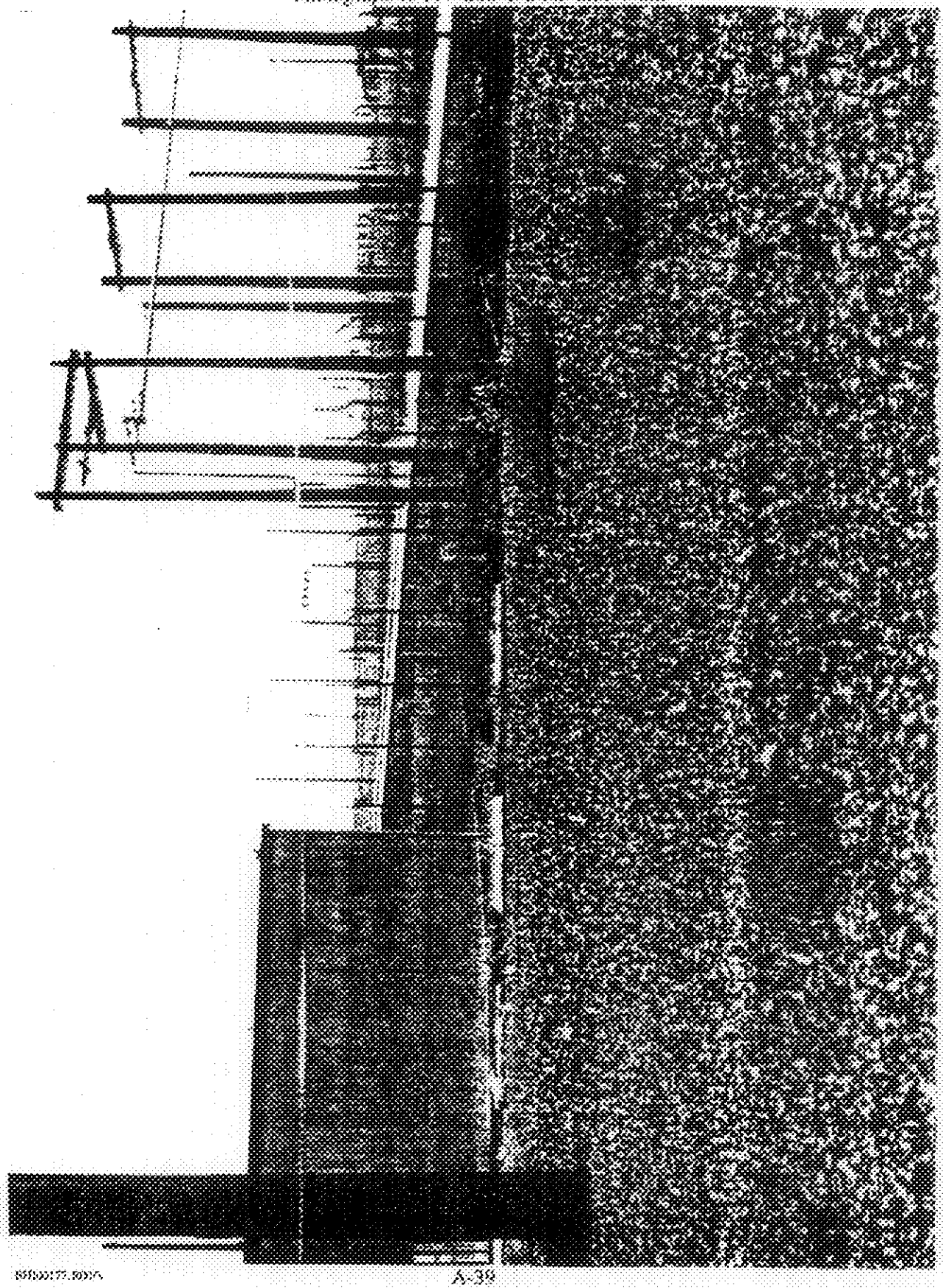
Photograph A-16. 216-T-12 Trench



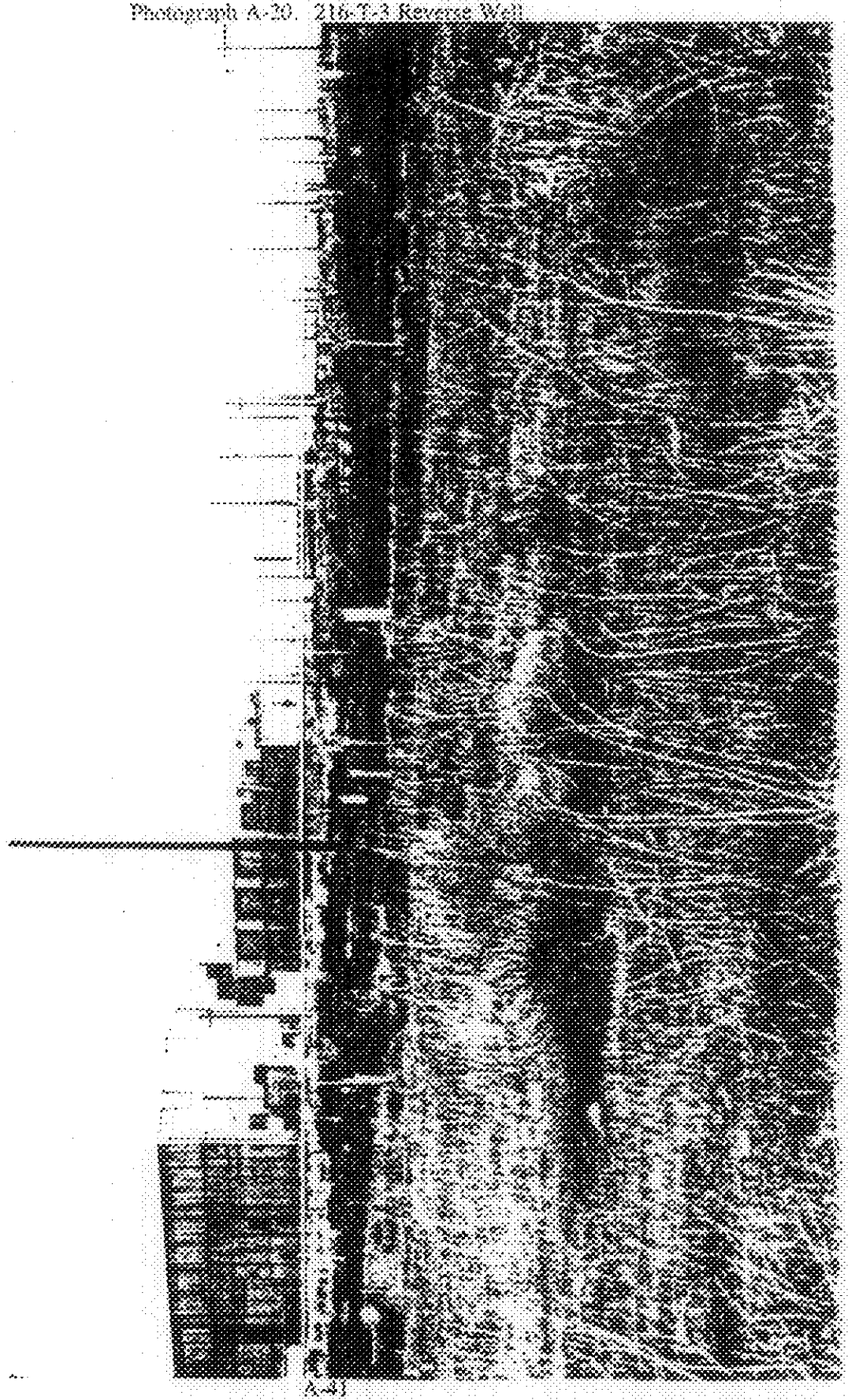
Photograph A-17. 216-T-14 Through 216-T-17 Trenches.

Photograph A-18. 216-T-1 Ditch

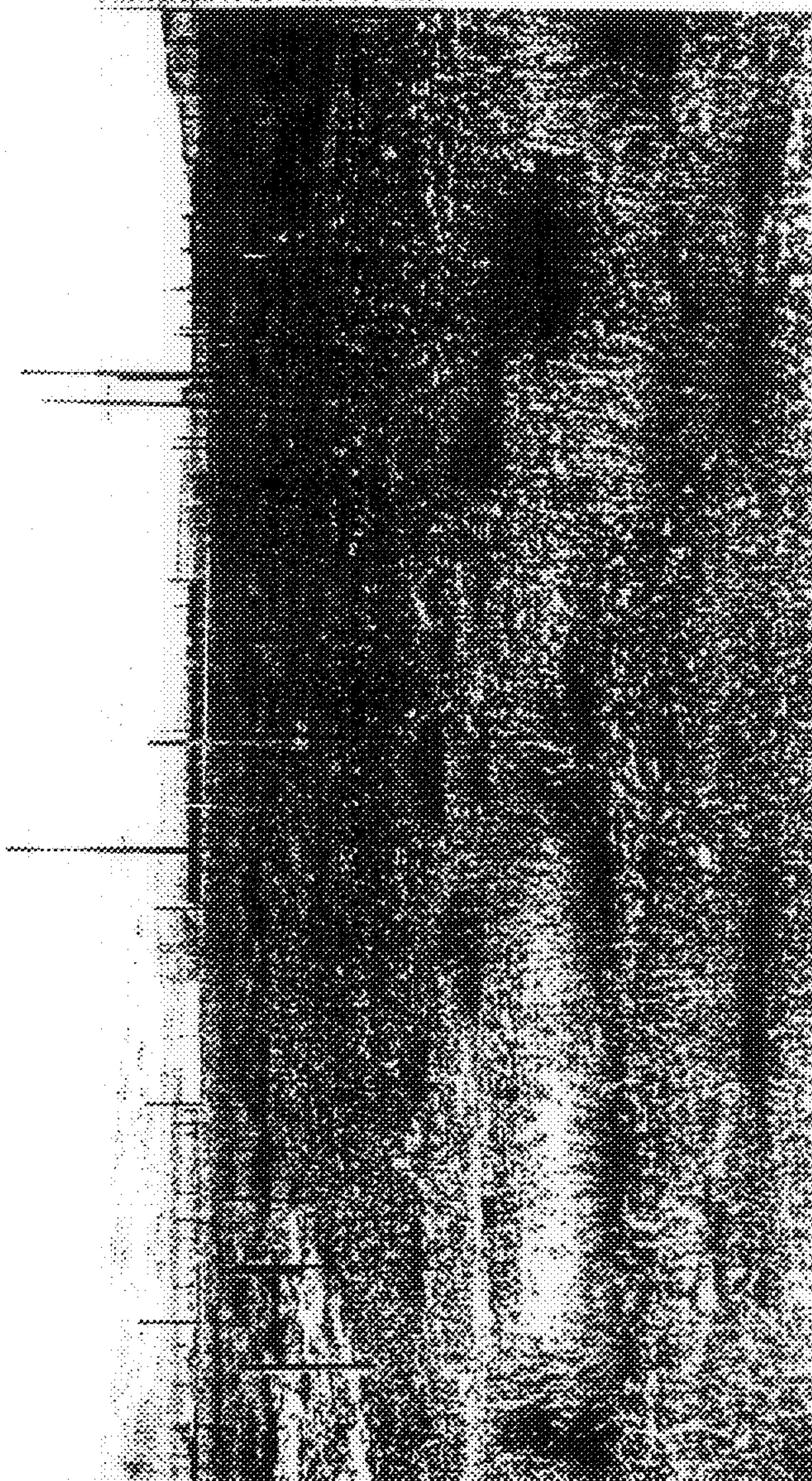
Photograph A-19 216-T-2 Reverse Well



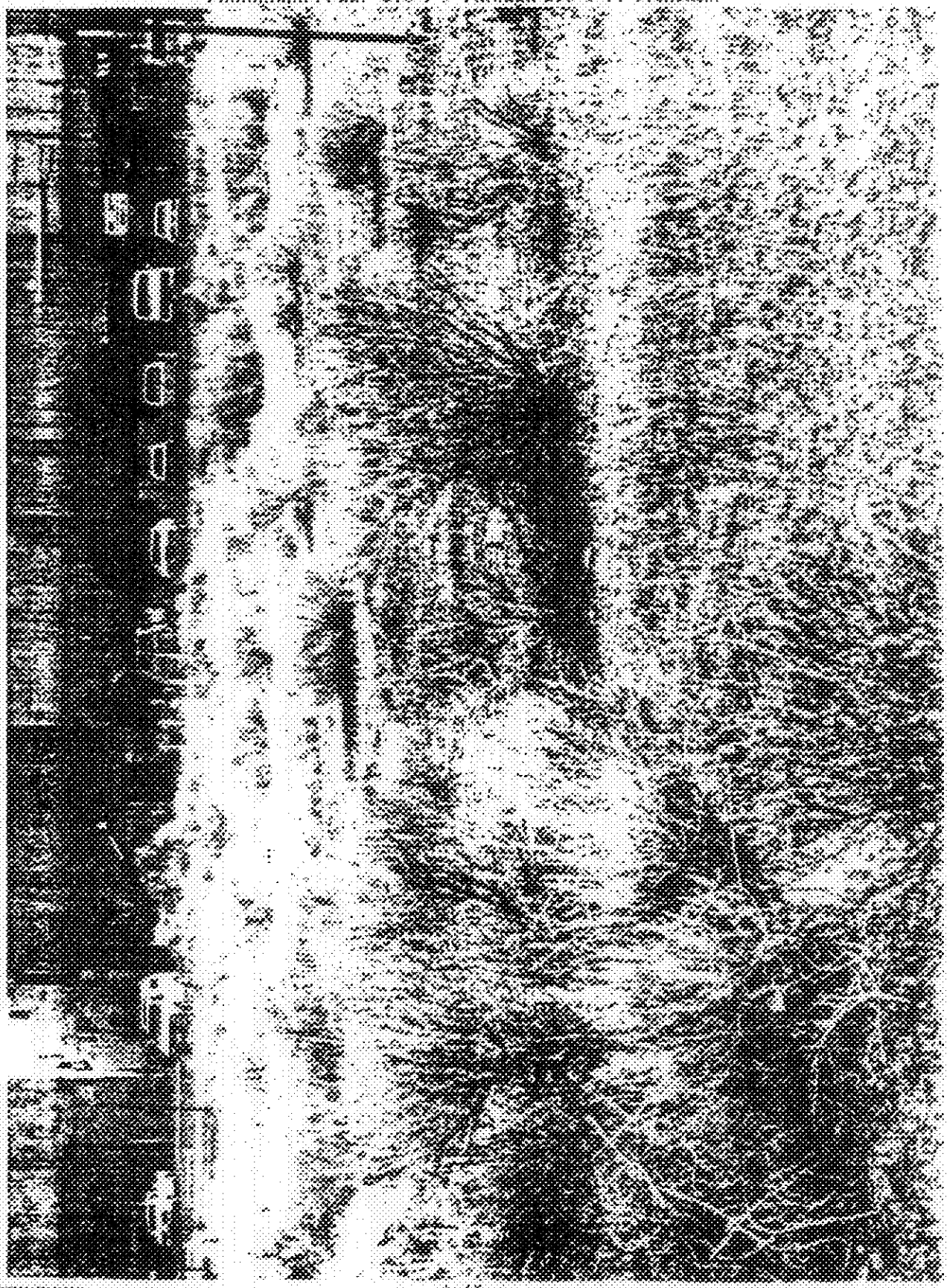
Photograph A-20. 216-T-3 Reverse Well



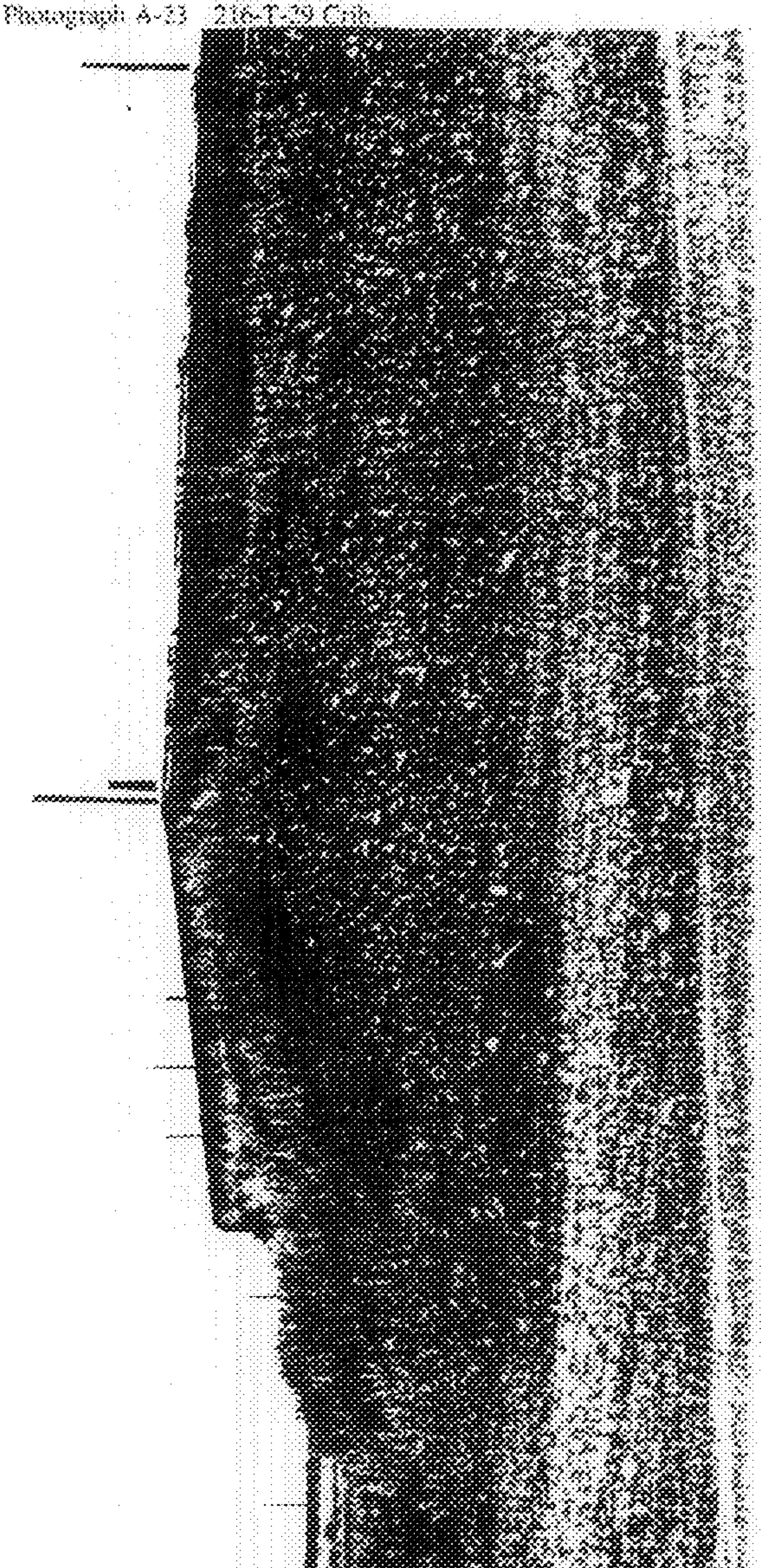
Photograph A-21. 216-T-8 Crib.



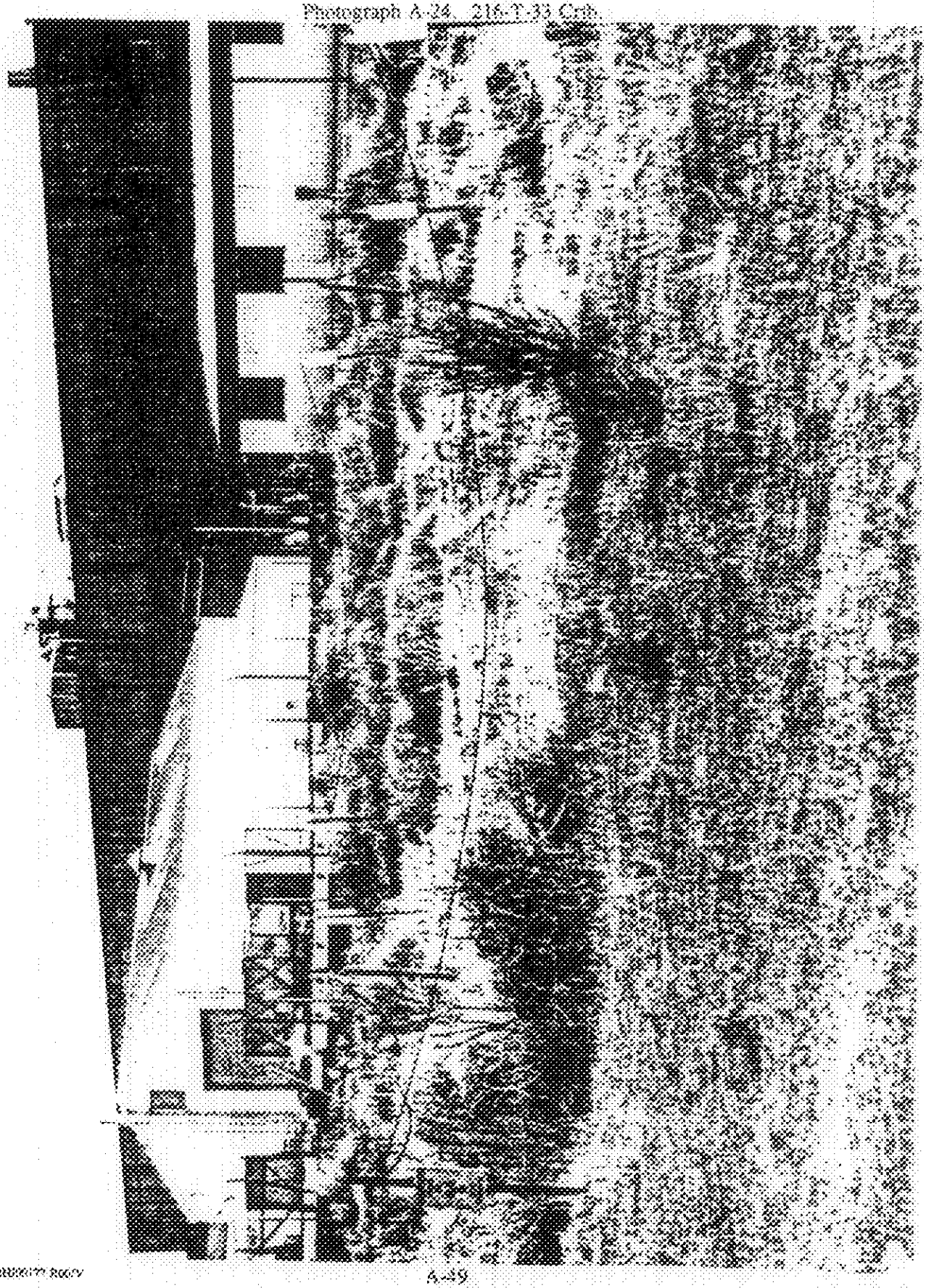
Photograph A-22. 216-T-9 Through 216-T-11 Trenches.



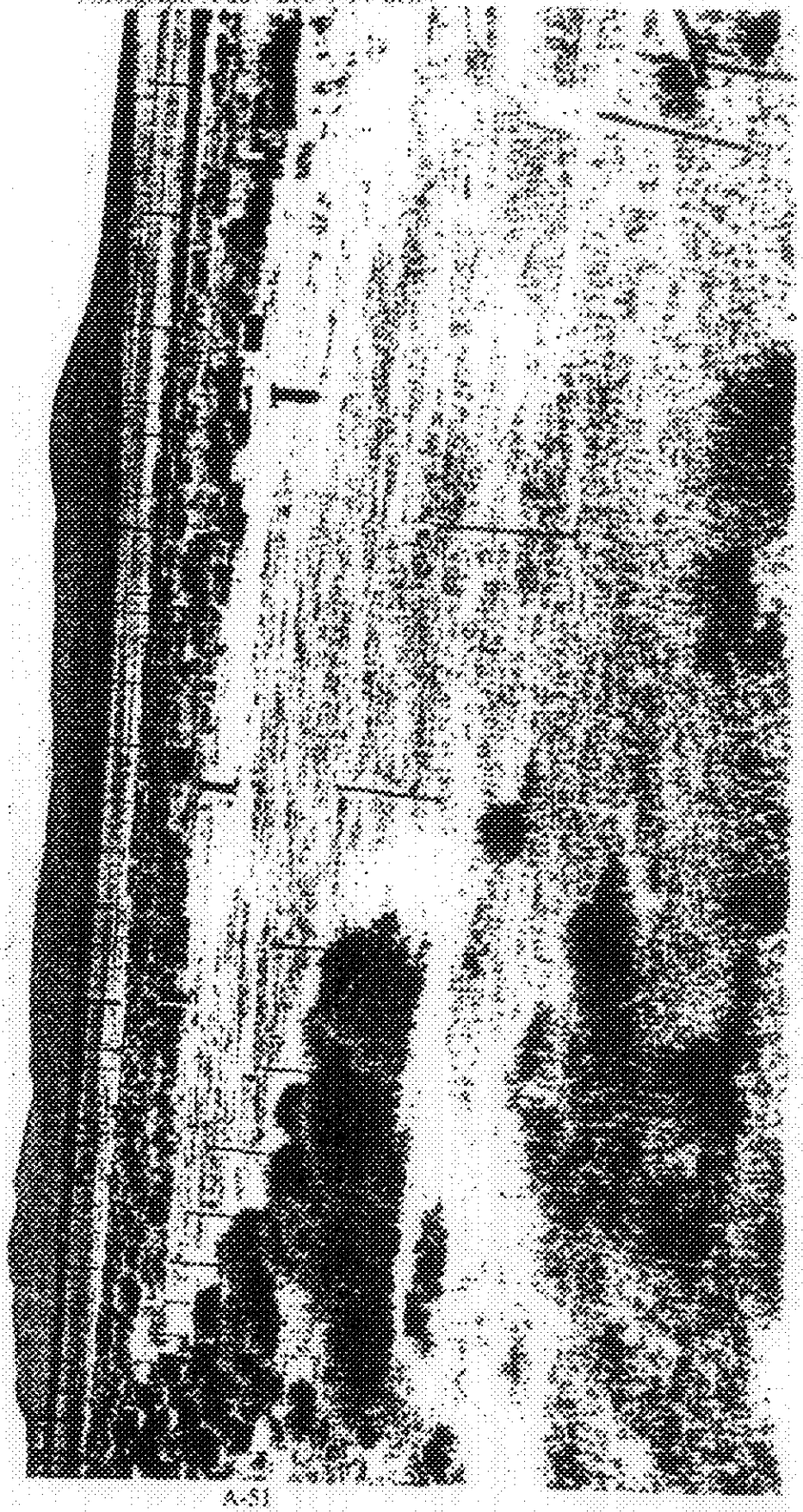
Photograph A-23 216-T-29 Crib



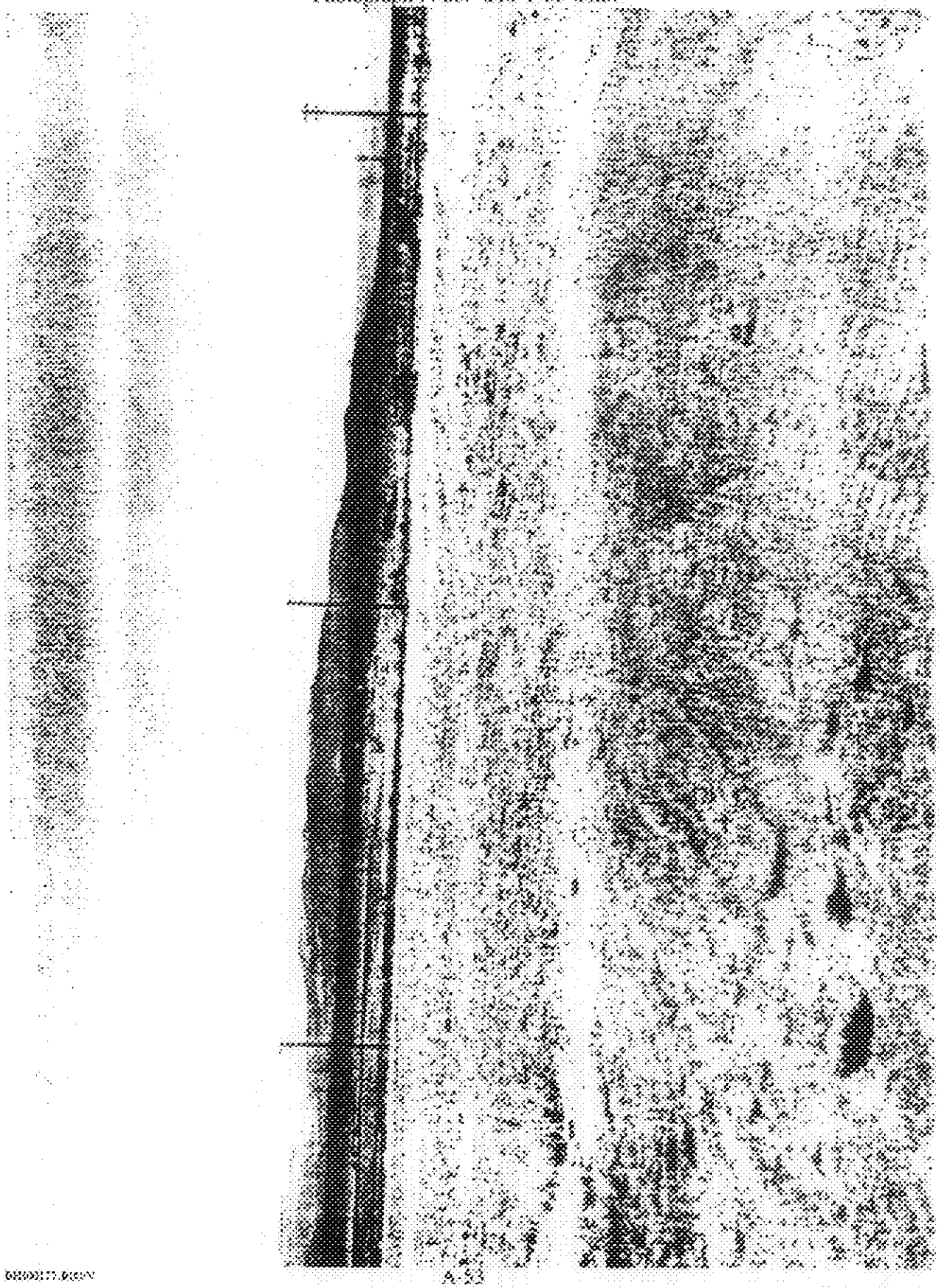
Photograph A-24. 216-T-33 Crib.



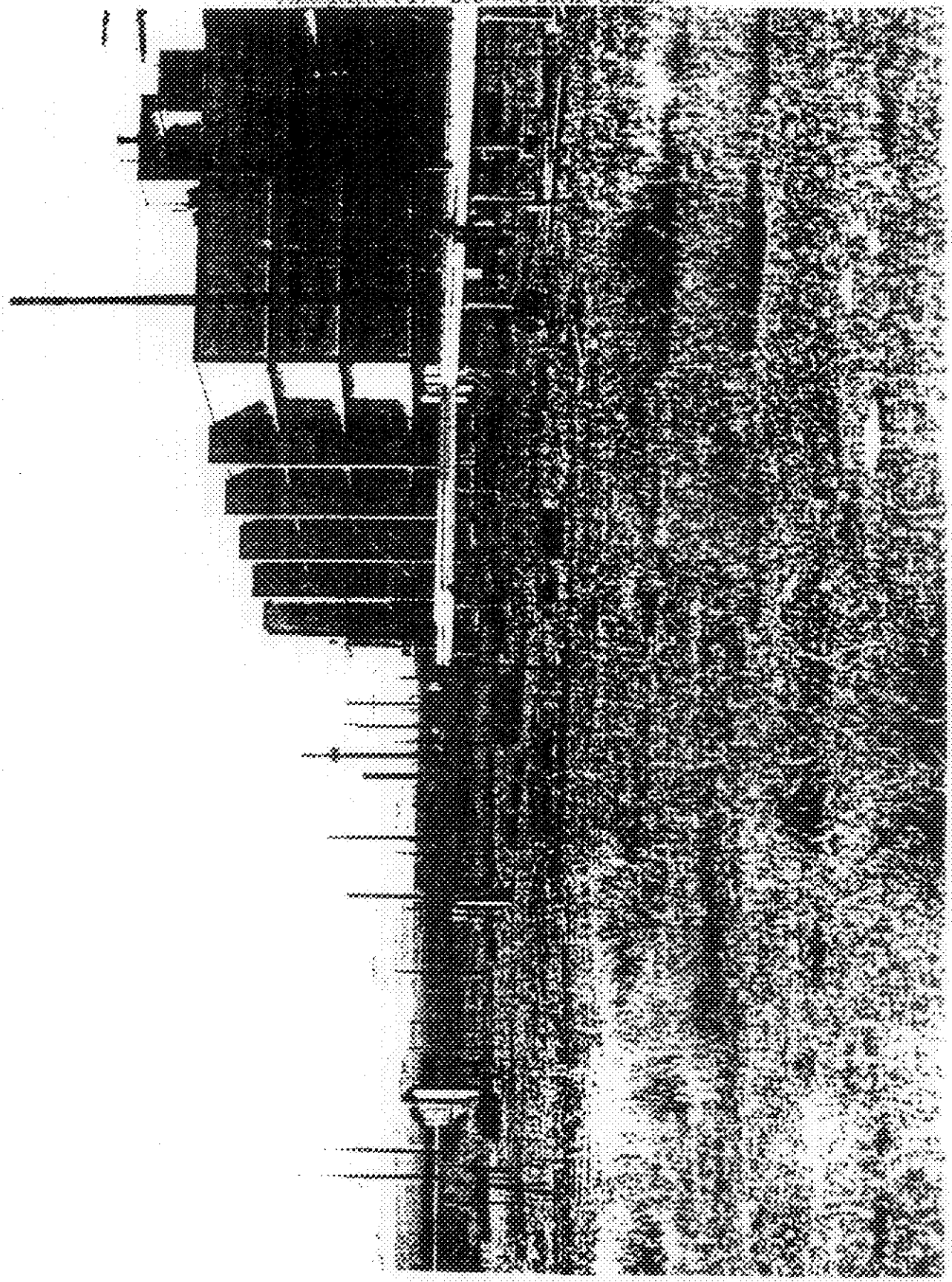
Photograph A-25. 216-T-34 Crib.



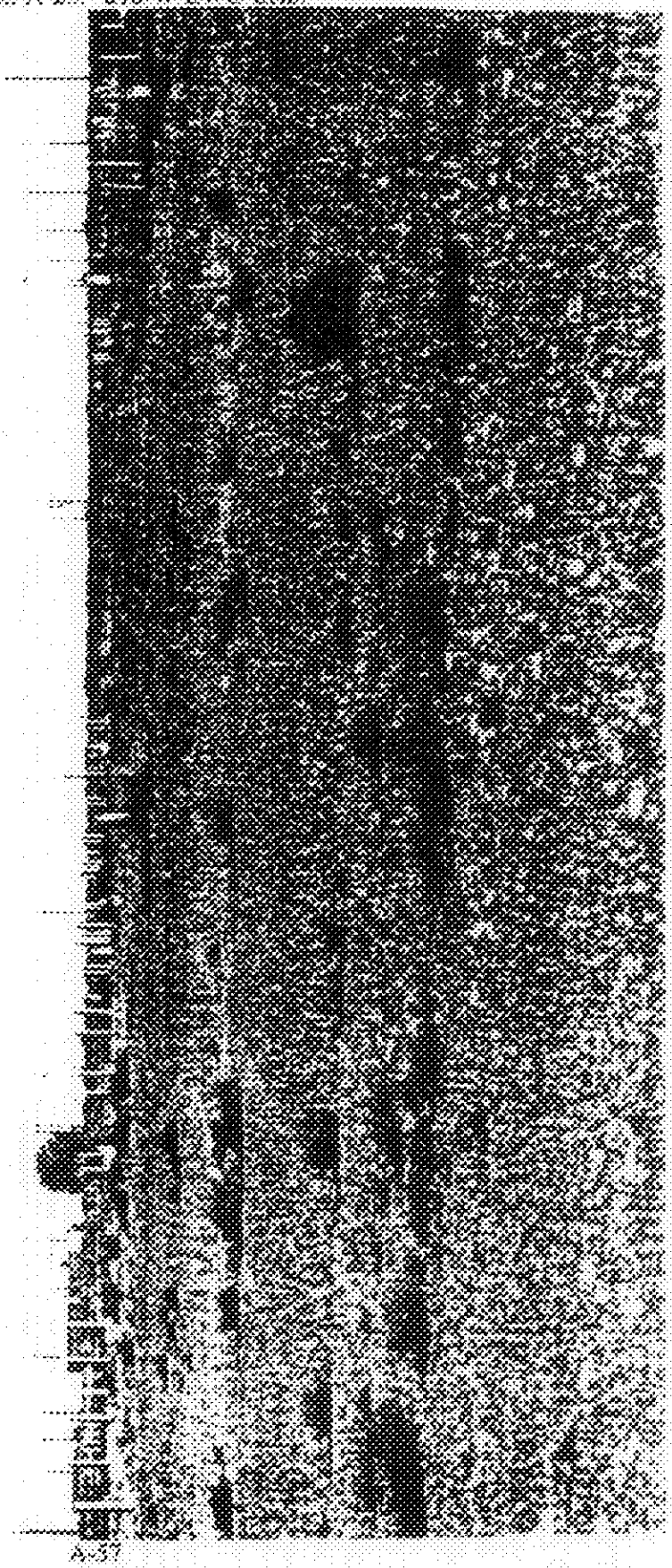
Photograph A-26. 216-T-35 Crib.



Photograph A-27. 218-W-8 Burial Ground



Photograph A-28. 216-W-LWC Crib



APPENDIX B

HANFORD SITE PHOTOGRAPH AND DRAWING LIST

Table B-1. List of Photographs and Technical Drawings for Operable Unit 200-TP-1.

Site	Photograph	Key Drawing	Other Selected Drawings						
216-T-21	122440-154-CN	H-2-36849							
216-T-22	122440-154-CN	H-2-36849							
216-T-23	122440-154-CN	H-2-36849	H-2-74440	H-2-57210	H-2-44510	H-2-34762			
216-T-24	122440-154-CN	H-2-36849	H-2-74440	H-2-44510	H-2-34762				
216-T-25	122440-154-CN	H-2-46286	H-2-46291	H-2-46292	H-2-32526	H-2-2430	H-2-74440	H-2-44510 #3	H-2-34762 rev-1
216-T-32	122440-124-CN	H-2-578	H-2-44511 #134	HW-72182 #1	H-2-558	H-2-44510	H-2-34762	H-3-57210	H-2-74439
216-T-36	122440-123-CN	SK-2-21661	H-2-34472	H-2-44510 #6	H-2-44511 #126	H-2-33472	H-2-44511 #134		
216-T-5	122440-125-CN	H-2-44551 #134	H-2-2430	H-2-44510 #6	H-2-578				
216-T-7TF	122440-124-CN	H-2-44511 #134							

Table B-2. List of Photographs and Technical Drawings for Operable Unit 200-TP-2.

Site	Photograph	Key Drawing	Other Selected Drawings		
200-W PP	none identified	H-2-44510 #101			
216-T-13	122440-145-CN	H-2-1495	H-2-44510 #6	H-2600 W #10	H-2-44511 #126
216-T-18	122440-146-CN	H-2-44511 #126			
216-T-19TF	122440-153-CN	H-2-44511 #110	H-2-0806	H-2-3019	H-2-0821
216-T-20	122440-151-CN	H-2-44510 #6	H-2-55176 #5		
216-T-26	122440-147-CN	H-2-2733	H-2-2735	H-2-2913	
216-T-27	122440-147-CN	H-2-2733	H-2-2735	H-2-2913	
216-T-28	122440-147-CN	H-2-2733	H-2-2735	H-2-2913	
216-T-302B	none identified	H-2-44511 #109			
216-T-31	none identified	H-2-1495	H-2-849	H-2-802	H-70445
241-TX-152	none identified	H-2-71484			
241-TX-155	none identified	H-2-843	H-2-840	H-2-44511 #109	
UN-200-W-113	none identified				
UN-200-W-135	none identified				
UN-200-W-14	none identified				
UN-200-W-29	none identified	H-6-951			
UN-200-W-99	none identified				

Table B-3. List of Photographs and Technical Drawings for Operable Unit 200-TP-3.

Site	Photograph	Key Drawing	Other Selected Drawings			
207-T	none identified	H-2-576	W-73975	H-2-34762		
216-T-12	122440-127-CN	H-2-44511 #133	H-2-2430	H-2-44510 #6	HW-55176 #5	
216-T-14	122440-128-CN	H-2-36849	SK-2-2409	H-2-44510 #6	H-2-44511 #141	H-2-44511 #142
216-T-15	122440-128-CN	H-2-36849	H-2-44511 #142	H-2-44510 #6	H-2-44511 #141	
216-T-16	122440-128-CN	H-2-36849	SK-2-2409	H-2-44510 #6	H-2-44511 #141	H-2-44511 #142
216-T-17	122440-128-CN	H-2-36849	SK-2-2409	H-2-44510 #6	H-2-44511 #141	H-2-44511 #142
216-T-4-1D	122440-122-CN	H-2-576	H-2-2430	H-2-34762	M-2600-W #10	H-2-44511 #142
216-T-4-2	122440-121-CN	H-2-34997	H-2-34998	H-3-57210	H-2-576	
216-T-4A	122440-120-CN	H-2-44510 #6	H-2-2430	H-2-578		
216-T-4B	122440-121-CN	H-2-34762	H-2-44511 #159	H-2-2430	H-2-44511 #142	
216-T-6	122440-129-CN	H-2-951	H-2-353			
UN-200-W-63	none identified					
UN-200-W-7	none identified					

Table B-4. List of Photographs and Technical Drawings for Operable Unit 200-TP-4.

Site	Photograph	Key Drawing	Other Selected Drawings					
216-T-1	122440-136-CN	H-2-44511 #148	H-2-2430	H-2-5101	H-2-2904 #11	H-2-44511	M-2892 #1	M-2600 #11
216-T-10	122440-131-CN	H-2-44511 #140						
216-T-11	122440-131-CN	H-2-44511 #140						
216-T-2	122440-142-CN	HW-69870 #1	H-2-353	M-2924 #11				
216-T-29	122440-137-CN	H-2-1348	H-2-1345	H-2-1371	H-2-1371			
216-T-3	122440-130-CN	H-2-951	H-2-353	H-2-1124				
216-T-33	122440-132-CN	H-2-32097	H-2-32096	H-2-44510 #6	H-2-44511 #140			
216-T-34	122440-133-CN	H-2-32650	H-2-32649	H-2-44511 #49	H-2-33446			
216-T-35	122440-134-CN	SK-2-21716	H-2-33447	H-2-33446				
216-T-8	122440-139-CN	H-2-353						
216-T-9	122440-131-CN	H-2-44511 #140	H-2-38877	H-2-44510 #6				
218-W-8	122440-138-CN	H-2-2322	H-2-1938	H-2-44511 #132				
241-T-361	none identified	H-2-44511 #133						
241-TX-154	none identified	H-2-839						
241-TX-302C	none identified	H-2-833						
2607-W3	none identified	H-2-1865						
2607-W4	none identified	H-2-44511 #140						
UN-200-W-102	none identified	H-2-44510 #4	H-2-34762	M-2600-W #11				
UN-200-W-137	none identified		H-2-5170					
UN-200-W-2	none identified							
UN-200-W-27	none identified							
UN-200-W-3	none identified							
UN-200-W-38	none identified							
UN-200-W-4	none identified							
UN-200-W-58	none identified							
UN-200-W-65	none identified							
UN-200-W-67	none identified							
UN-200-W-73	none identified							
UN-200-W-77	none identified							
UN-200-W-8	none identified							
UN-200-W-85	none identified							
UN-200-W-98	none identified							

Table B-5. List of Photographs and Technical Drawings for Operable Unit 200-TP-5.

Site	Photograph	Key Drawing	Other Selected Drawings				
241-TX-101	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-102	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-103	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-104	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-105	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-106	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-107	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-108	none identified	H-2-806	H-2-44511 #110	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-109	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-110	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-111	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-112	none identified	H-2-44511 #118	H-2-806	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-113	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-114	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-115	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-116	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-117	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-118	none identified	H-2-806	H-2-44511 #118	H-2-808	H-2-1124	H-2-1204 #1	
241-TX-153	none identified	H-2-44511 #110					
241-TX-302A	none identified	H-2-833	H-2-44511 #110				
241-TXR-152	none identified	H-2-71484	H-2-42386	H-2-44511 #110			
241-TXR-153	none identified	H-2-44511 #110					
241-TY-101	none identified	H-2-2223	H-2-44511 #126	H-2-2567	H-2-36947	H-2-72081	H-2-73117
241-TY-102	none identified	H-2-2223	H-2-44511 #126	H-2-2567	H-2-36947		
241-TY-103	none identified	H-2-2223	H-2-44511 #126	H-2-2567	H-2-36947		
241-TY-104	none identified	H-2-2223	H-2-44511 #126	H-2-2567	H-2-36947		
241-TY-105	none identified	H-2-2223	H-2-44511 #118	H-2-2567	H-2-36947		
241-TY-106	none identified	H-2-2223	H-2-44511 #118	H-2-2567	H-2-36947		
241-TY-153	none identified	H-2-2223	H-2-44511 #118	H-2-2567			
241-TY-302A	none identified	H-2-44511 #118					
241-TY-302B	none identified	H-2-44511 #126					
242-T-151	none identified	H-2-44511 #118					
2607-WT	none identified	H-2-44511 #118					
2607-WTX	none identified	H-2-44511 #110					
UN-200-W-100	none identified	H-2-44511 #110					
UN-200-W-17	none identified	H-2-44511 #118					
UN-200-W-76	none identified	H-2-44511 #109					

Table B-6. List of Photographs and Technical Drawings for Operable Unit 200-TP-6.

Site	Photograph	Key Drawing	Other Selected Drawings
241-T-101	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-102	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-103	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-104	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-105	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-106	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-107	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-108	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-109	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-110	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-111	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-112	none identified	H-2-578	H-2-44511 #134 H-2-1124
241-T-151	none identified	H-2-44511 #134	
241-T-152	none identified	H-2-44511 #134	
241-T-153	none identified	H-2-578	H-2-44511 #134
241-T-201	none identified	H-2-44511 #134	
241-T-202	none identified	H-2-44511 #134	
241-T-203	none identified	H-2-44511 #134	
241-T-204	none identified	H-2-44511 #134	
241-T-252	none identified	H-2-44511 #134	
241-T-301	none identified	H-2-44511 #134	
241-T-302	none identified	H-2-578	H-2-44511 #134
241-TR-152	none identified	H-2-44511 #134	
241-TR-153	none identified	H-2-44511 #134	
UN-200-W-62	none identified	H-2-44511 #134	
UN-200-W-64	none identified	H-2-44511 #134	
UN-200-W-97	none identified	H-2-44511 #134	

Table B-7. List of Photographs and Technical Drawings for Operable Unit 200-SS-2.

Site	Photograph	Key Drawing	Other Selected Drawings			
200-W Burn Pit	122440-224-CN	H-2-44510 #3	H-2-34762	H-2-57210		
216-W-LWC	122440-225-CN	H-2-44510 #5	H-2-90272 #2	H-2-90272 #1	H-2-57210	H-2-44511 #99
2607-W1	none identified	H-2-44511 #100				
2607-W2	none identified	H-2-44511 #98				

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